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FOOD SECURITY ASSESSMENT, 2008-09



A decrease in export earnings and capital inflows could increase the number of food-insecure people worldwide by 100 million.



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Department
of Agriculture

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A Report from the Economic Research Service

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Food Security Assessment, 2008-09

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Abstract

Food security in 70 developing countries is projected to deteriorate over the next decade, according to USDA's Economic Research Service. After rising nearly 11 percent from 2007 to 2008, the number of food-insecure people in the developing countries analyzed by ERS researchers is estimated to rise to 833 million in 2009, an almost 2-percent rise from 2008 to 2009. Despite a decline in food prices in late 2008, deteriorating purchasing power and food security are expected in 2009 because of the growing financial deficits and higher inflation that have occurred in recent years. Food-insecure people are defined as those consuming less than the nutritional target of 2,100 calories per day per person.

Keywords: food security, prices, production, commercial imports, export earnings, capital inflows, remittances, foreign direct investment, food aid, Sub-Saharan Africa, North Africa, Asia, Latin America, the Caribbean, Commonwealth of Independent States, Economic Research Service, USDA

Preface

This report continues the series of food assessments begun in the late 1970s. *Global Food Assessments* were done from 1990 to 1992, hence the GFA series. In 1993, the title was changed to *Food Aid Needs Assessment* to more accurately reflect the contents of the report, which focuses on selected developing countries with past or continuing food deficits. In 1997, we widened our analysis beyond the assessment of aggregate food availability to include more aspects of food security. We therefore changed the title to *Food Security Assessment*.

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Summary

After rising between 2007 and 2008, the number of food-insecure people in 70 developing countries is projected to increase between 2008 and 2009, according to USDA's Economic Research Service. This ongoing rise in the number of food-insecure people is due to the continuation of high food prices and the global economic downturn. Food-insecure people are defined as those consuming less than the nutritional target of 2,100 calories per day per person.

What Is the Issue?

The current global economic crisis is threatening all parts of the world and there is no consensus as to how long it will last and how deep it will get before a recovery occurs. Reflecting the uncertainty of the current economic climate, in a January 2009 update the International Monetary Fund (IMF) lowered its initial October 2008 projections of world economic growth for 2009. This lower growth, coupled with the financial pressures created by rising 2006-08 food and fuel prices, has resulted in a precarious food-security situation for many lower income countries. In *Food Security Assessment, 2008-09*, ERS researchers estimate and project the number of food-insecure people regionally and in each of 70 developing countries for 2008 through 2018.

What Did the Study Find?

Food security in developing countries worsened between 2007 and 2008. The number of food insecure people in the 70 developing countries studied by ERS is estimated to have increased nearly 11 percent or about 80 million people in that time. Despite a decline in prices in late 2008, purchasing power and food security were expected to deteriorate in 2009 because of the growing financial deficits and higher inflation that occurred in recent years. ERS food-security baseline estimations of the 70 countries studied showed a near-2-percent increase in the number of food-insecure people in 2009, reaching 833 million.

Growth in the number of food-insecure people is highest in Sub-Saharan Africa (SSA) because domestic production is expected to revert to normal levels in 2009 from the above-average or bumper crops that were experienced in many countries in 2008. The distribution gap overall is estimated to decline by 6 percent, mainly because of the baseline-estimated improvement in food security in Asia, which far outpaced the growth in the gap in SSA. The distribution gap is the amount of food needed to raise consumption in each income group to meet nutritional requirements of 2,100 calories per person per day.

To evaluate the likely impact of the financial crisis on food security of lower income countries, ERS developed a scenario based on the latest IMF projections in which export earnings growth as well as capital inflows contract from the base level for 2009. Under this scenario, the number of food-insecure people in the 70 countries is estimated to increase 12 percent (or 97 million) from the baseline for 2009.

The impact of this scenario is projected to be greatest in the Latin America and the Caribbean (LAC) region, where the number of food-insecure people

is estimated to increase 20 percent (or 10 million) from the baseline level for 2009. In the baseline, 32 percent of the region's population were projected to be food insecure in 2009, but this share is projected at more than 38 percent under this scenario of reduced export earnings and capital inflows.

The number of food-insecure people in Asia is estimated to increase nearly 13 percent (or 47 million) from the 2009 baseline. As these countries have further increased their share of global trade, they have become increasingly linked to the state of the international economic environment, particularly the performance and policies of the major developed countries. Weakening of the global economy directly affects the food-security situation of the countries of this region, many of which suffer from persistent extreme poverty.

Under this scenario, the number of food-insecure people in SSA is projected to increase by 9 percent or 36 million from the baseline. The countries that will be hardest hit by the economic crisis are those with high balance-of-payments deficits and high food-import dependence. In SSA, many countries have become more dependent on food imports because of a combination of slow domestic production growth, high population growth (highest of all the regions), low income growth, market liberalization policies, and, more recently, a boost in foreign direct investment.

Assuming a rebound in the global economy in 2010, the number of food-insecure people would remain relatively flat through the next decade, reaching 834 million by 2018. The trends in the two large food-insecure regions of SSA and Asia are projected to diverge; deteriorating food security is projected for SSA, while an improvement is projected for Asia. SSA will remain the most vulnerable region in 2018, with 25 percent of the population of the 70 countries but 57 percent of the food-insecure people.

How Was the Study Conducted?

All historical and projected data are updated relative to the 2007 *Food Security Assessment* report. Food production estimates for 2008 are based on data from the United Nations' Food and Agriculture Organization (FAO) as of February 2009. Historical production data are from FAO and food aid data from World Food Programme (WFP). Financial and macroeconomic data are based on the latest World Bank data, as of February 2009. Projected macroeconomic variables are either based on calculated growth rates for the 1990s through the mid-2000s or are World Bank projections. Projections of food availability include food aid, with the assumption that each country will receive the 2005-07 average level of food aid throughout the next decade.

Overview: Food-Security Impact of the Financial Downturn, 2008-18

The current global economic crisis is threatening all parts of the world and there is no consensus as to how long it will last and how deep it will get before a recovery. According to analysis by researchers with USDA's Economic Research Service, 100 million more people may experience food insecurity in 2009 if International Monetary Fund (IMF) projections of world economic growth for 2009 become a reality. Reflecting the uncertainty of the current economic climate, the IMF lowered its projections of world economic growth between an initial estimate in October 2008 and a January 2009 update. This lower growth projection, coupled with the financial pressures created by the rising food and fuel prices of 2006-08, has resulted in a precarious food-security situation for many lower income countries.

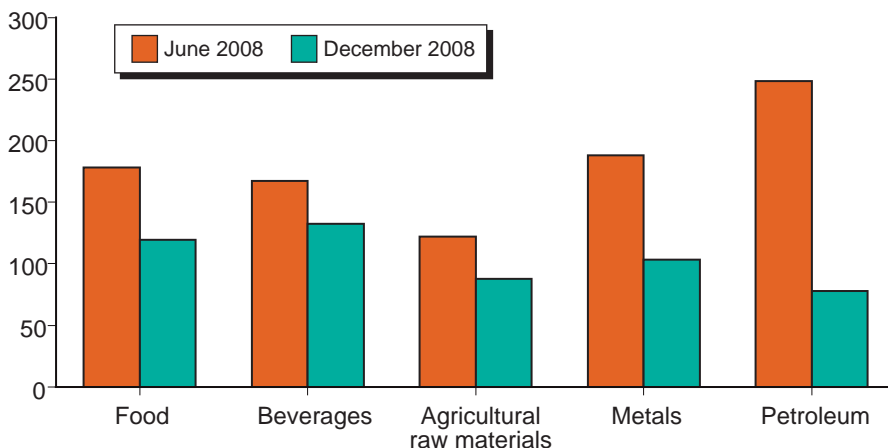
Commodity prices continued their rise in the early part of 2008, but then fell in the later part of the year. From July to December 2008, international prices for food and fuel—key imports of developing countries—declined sharply. Oil prices were cut by nearly 70 percent and food prices by 33 percent. However, prices of food and fuel still remain much higher than they were for much of this decade (fig. 1). The decline in food prices was a positive development for lower income, food-deficit countries, many of which are becoming more dependent on imported foods and food ingredients. However, the rate of decline in food prices was relatively modest compared with the decline in prices of some countries' exports, particularly metals. During the later part of 2008, metal prices declined 45 percent, and prices of agricultural raw materials, such as cotton, which had not increased significantly since 2004, fell nearly 30 percent.

For many countries, this decline in their terms of trade (ratio of a country's export price to its import price), coupled with the more difficult global financial environment, significantly weakened food security because many of these countries increased their food imports (fig. 2). This growing reliance on

Figure 1

Food and commodity prices declined in 2008

Index price (2005=100)

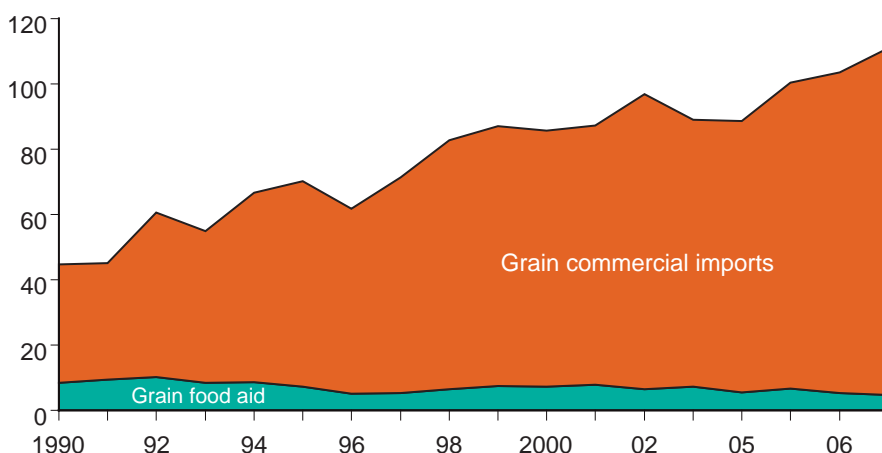


Source: International Monetary Fund.

Figure 2

Growing commercial grain imports in the 70 countries

Mil. tons



Source: UN Food and Agriculture Organization and UN World Food Programme.

food imports was spurred by income growth, trade liberalization policies, and improvements in the global transportation system. Imported foods, including basic staples such as grains and vegetable oils, are an important component of diets in most countries. Available data from 1970 to 2003 show that import dependence grew the most among the least developed countries (LDCs), those with per capita incomes below \$750 per year. In 2003, grain imports accounted for 17 percent of their consumption (compared with 8 percent in 1970), sugar and sweeteners for 45 percent (compared with 18 percent in 1970), and vegetable oils for 55 percent (compared with 9 percent in 1970).

In This Report

Seventy developing countries are covered in this report. Projections of food availability include food aid, with the assumption that each country will receive the 2005-07 average level of food aid throughout the next decade. All historical and projected data are updated relative to *Food Security Assessment, 2007*. Food production estimates for 2008 are based on data from the United Nations' Food and Agriculture Organization (FAO) as of February 2009. Historical production data are from FAO and food aid data from World Food Programme (WFP). Financial and macroeconomic data are based on the World Bank data as of February 2009. Projected macroeconomic variables are either based on calculated growth rates for the 1990s through the mid-2000s or are IMF and World Bank projections.

This report includes a special article, "Developing Countries Face Urbanization Growth, Food-Security Worries, and Food Safety Challenges., which reviews the impact of the rise in urbanization in all developing countries by 2030. The article notes that poor and food-insecure people will account for a large share of urban growth because of rural migration and natural growth. Fertility rates are higher among the poor than among higher income populations. Food safety is becoming a bigger concern as consumption becomes more dependent on purchases from markets instead of home production.

Widespread Food Insecurity in 2008

Food security in developing countries worsened between 2007 and 2008. The number of food-insecure people in the 70 developing countries studied by ERS is estimated to have increased nearly 11 percent or by about 80 million people (see box, “How Food Security Is Assessed: Methods and Definitions”). In most cases, the deterioration in food security reflected limited purchasing power of the poor due to rising food inflation rather than a major food production shortfall.

The food gap to meet nutritional requirements (at the average national level) of 2,100 calories per person per day was estimated at 11 million tons in grain equivalent for 2008 (table 1). Fifty-five percent of this gap was in Sub-Saharan Africa (SSA), the region most vulnerable to food insecurity. The intensity of global food insecurity (measured by the distribution gap—the amount of food needed to raise consumption in each income group to meet nutritional requirements) increased about 25 percent between 2007 and 2008, up 4 million tons to more than 24 million tons. Sub-Saharan Africa accounted for 60 percent of this gap even though it represented just one-quarter of the population of the countries studied here. The Asian countries, with 63 percent of the population, accounted for 32 percent of the distribution gap and Latin America and the Caribbean (LAC) accounted for 7.5 percent (fig. 3). (See the following sections for more detailed regional analysis.)

Table 1

Food availability and food gaps for 70 countries

Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)		Aggregate availability of all food
			1,000 tons			
1999	568,938	68,961	66,508	8,586		809,488
2000	565,939	70,877	65,820	8,700		825,208
2001	583,065	73,247	63,286	9,601		833,481
2002	556,111	75,535	74,672	8,284		844,998
2003	610,166	77,577	67,170	8,599		868,545
2004	604,933	81,154	67,969	6,654		884,552
2005	635,850	84,314	78,841	8,387		923,225
2006	657,060	87,176	86,661	6,695		952,547
2007	673,609	88,494	92,211	5,873		971,359
Projections				Food gap*		
				NR	DG	
2008	692,168	89,639	78,919	11,399	24,407	970,420
2013	753,848	97,295	90,682	8,115	22,730	1,056,173
2018	822,474	105,515	100,952	10,174	24,459	1,145,687

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT, UN Food and Agriculture Organization and World Food Program..

How Food Security Is Assessed: Methods and Definitions

The Food Security Assessment model used in this report is based on 2008 data (updated in February 2009), and, therefore, does not reflect any subsequent changes that may have transpired related to the food-security situation of these countries. An annual update includes revising all historical data, as sometimes new information leads to changes in historical data series. Those updates can therefore change food-security estimates for past years. Food-security indicators for 2008, 2009, and future years are estimates. Commodities covered in this report include grains, root crops, and “other” which refers to the remainder of the diet. The three groups account for 100 percent of all calories consumed in the study countries and are expressed in grain equivalent. The conversion is based on calorie content. For example, grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is, therefore, equivalent to 0.29 ton of grain (1 divided by 3.5), and 1 ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

Food consumption and food access are projected in 70 lower income developing countries—37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 10 in Asia, and 8 in the Commonwealth of Independent States. (See appendix 1 for a detailed description of the methodology and definitions of terms and appendix table 1 for a list of countries.) The short term projection (2008) is based on FAO preliminary production assessment, and the long term projections are based on 2005-07 production data and 2004-06 macro data. For commercial imports, the 2008 figure is based on projections, not actual data. The periods covered are 2008, 2009 (projection), and 2018 (10-year projection). The model analyzes the gap between projected food availability (production plus commercial and food aid imports minus nonfood use) and two alternative consumption standards. The nutritional standard is the per capita nutritional requirements (NR) of roughly 2,100 calories per capita per day—depending on the region. The average **nutrition gap** is the gap between available food and food needed

to support a per capita nutritional standard (for definitions of terms used see appendix 1).

The estimated **distribution gap** measures the food needed to raise consumption in each income quintile to the nutritional requirement. In many countries, consumption in the lower income quintiles is significantly below the average (per capita) consumption for the country as a whole. In these countries, the distribution gap provides a measure of the intensity of hunger—the extent to which the food security of already hungry people deteriorates as a result of income or economic conditions. In some countries average consumption of the poorest quintile (20 percent) of the population narrowly exceeds nutritional requirements. In such cases we include the lowest decile (10 percent) of the population in our estimation of food gaps. However, when our estimates show no distribution gap for the poorest 10 percent population, we consider the country food secure despite the fact that food insecurity may exist, but for less than 10 percent of the population. Finally, based on the population share who consume below nutritional requirements and total population data, the projected number of people who cannot meet their nutritional requirements is calculated.

The common terms used in the reports are:

- **Domestic food supply**—the sum of domestic production and commercial and food aid imports
- **Food availability**—food supply minus nonfood use, such as feed and waste
- **Import dependency**—the ratio of food imports to food supply
- **Food consumption**—which is equal to food availability.
- **Food-insecure**—which is when average per capita food consumption for a country or income quintile falls short of the nutritional requirement.

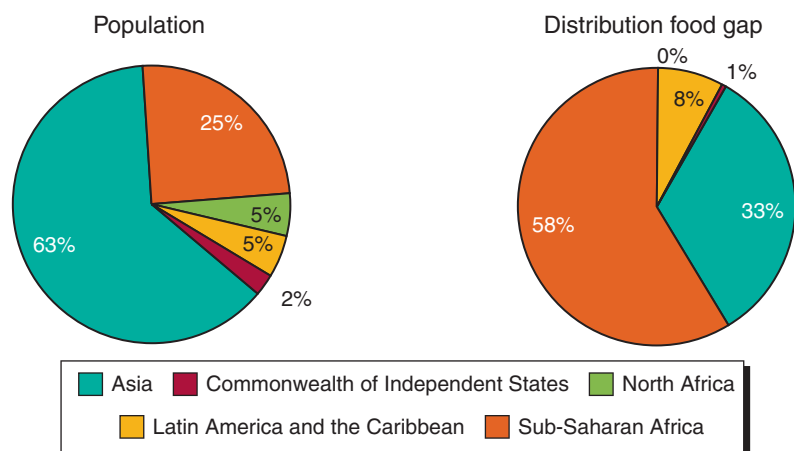
The difference between these gaps reflects the *intensity and depth* of the impact of skewed purchasing power on food security within countries. To put these numbers in perspective, the amount of food aid these countries received in 2007 (the last year data was available) was less than 6 million tons.

Financial Crisis Will Deepen Food Insecurity in 2009

Despite a decline in prices in the later part of 2008, deteriorating purchasing power and food security were expected in 2009 because of the growing financial deficits and higher inflation of recent years. ERS food-security baseline estimations for the 70 countries show a near 2-percent increase in the number

Figure 3

Population share versus distribution food gap share, 2008



Source: USDA, Economic Research Service, based on UN FAOSTAT.

of food-insecure people in 2009. The growth in the number of food-insecure people was highest in SSA because domestic production is expected to revert to normal levels rather than the above-average levels experienced in many countries in 2008. The distribution gap for 2009 is estimated to decline by 6 percent, mainly because of the estimated improvement in food security in Asia that far outpaced the growth in food gap in SSA.

The economic outlook worsened in the early months of 2009 as the International Monetary Fund has projected a global economic downturn. The key questions are: How much will the import capacity of the lower income countries contract? What are the implications for their food security? Assuming no major domestic production shortfalls, the two critical determinants of food imports and consequently food security in 2009 are changes in export earnings and changes in import financing capital inflows (credit, foreign direct investment, financial assistance, and remittances).

ERS developed two scenarios to interpret how the worldwide financial crisis might affect food security in developing countries (see box, “Scenarios Evaluate Likely Impact of Financial Crisis”). In Scenario 1, the reduction in export earnings growth, and the subsequent cut in import capacity, is projected to result in a decline in food consumption. Consequently, the distribution gap is projected to increase by 2 percent from the food-security baseline and the number of food-insecure people is projected to rise by 7 percent or 61 million in 2009 (fig. 4). The impact will not be uniform across all regions and countries as the results vary depending upon countries’ import dependence and the significance of export earnings in overall foreign exchange availability of the countries. Food security in the Asian countries would be affected deeply, with the number of food-insecure people increasing by 11 percent. This comes after the Asian countries experienced the highest export growth, relative to other regions (over 10 percent per year since 2000). In SSA, a decline in export earnings growth will intensify food insecurity, increasing the number of food-insecure people by 3 percent.

Scenarios Evaluate Likely Impact of Financial Crisis

ERS developed two scenarios to evaluate the likely impact of the financial crisis on food security of lower income countries in 2009, based on IMF projections (International Monetary Fund, *World Economic Outlook*, January 2009):

Scenario 1. Export growth of the countries is reduced in 2009 relative to the baseline estimates. This reduction uses the same proportion as the estimated decline in the countries' economic growth for 2009 (50-percent decline in export growth in North Africa and Sub-Saharan Africa, 40 percent in Asia, and 60 percent in Latin America and Caribbean countries and in the Commonwealth of Independent States). This scenario assumes constant financial inflows at the base level to finance trade deficits of the countries.

Scenario 2. A 50-percent reduction in the level of capital inflows that finance imports in 2009 due to tightening global credit markets is added to the assumption of the first scenario. Although lower income countries have weaker linkages with the rest of the world, over time capital inflows have become a major source of import financing. Throughout this report, we compare the results of these scenarios with the 2009 baseline results of our model.

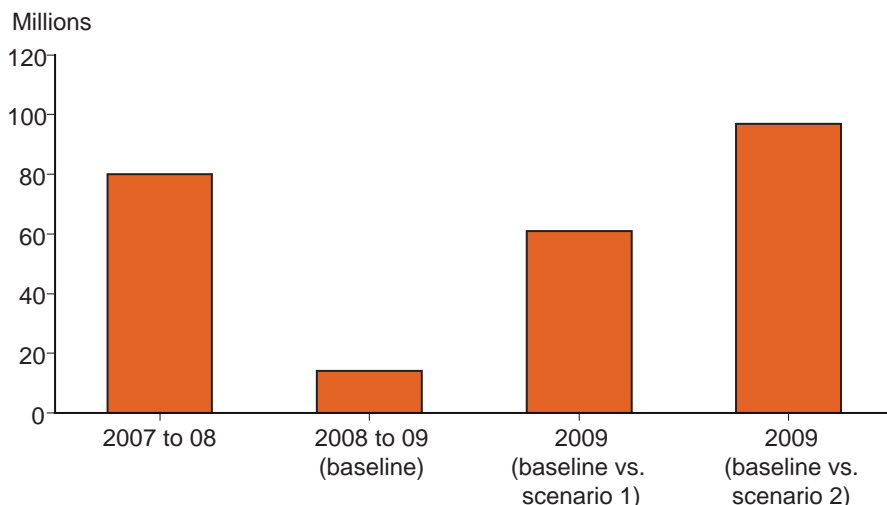
Under Scenario 2, when the cutback in capital inflows is added to the decline in export earnings growth, the food-security situation of the study countries is projected to deteriorate further. Under this scenario, the number of food-insecure people in the 70 countries is estimated to increase 12 percent (or 97 million) from the baseline for 2009 (fig. 4). The share of the number of food-insecure people is the highest in Sub-Saharan Africa, 48 percent; followed by Asia, 45 percent; Latin America and the Caribbean, 6 percent; and Commonwealth of Independent States, 1 percent. No change in food security is projected for North Africa.

The impact is projected to be greatest in the LAC region, where the number of food-insecure people is estimated to increase 20 percent (or 10 million) from the baseline level for 2009. In the baseline, 32 percent of the region's population was projected to be food insecure in 2009, increasing to 38 percent of the population under scenario 2. The number of food-insecure people in Asia is estimated to increase nearly 13 percent (or 47 million) from the 2009 baseline (fig. 5). As these countries have further increased their share of global trade, they have become increasingly linked to the state of the international economic environment, particularly the performance and policies of the major developed countries. The weakening of the global economy directly affects the food-security situation of the countries of this region, many of which suffer from persistent extreme poverty. The impact will be limited in India because that country's cautious financial policies reduced its exposure to external financial shocks. In addition, the continuing government support for the agricultural sector has changed the profile of the country from a net importer of grains to net exporter.

Under Scenario 2, the number of food-insecure people in SSA is projected to increase by 9 percent or 36 million. SSA is the world's most food-insecure region. Average food intake in the region is by far the lowest in the world,

Figure 4

Change in the number of food-insecure people



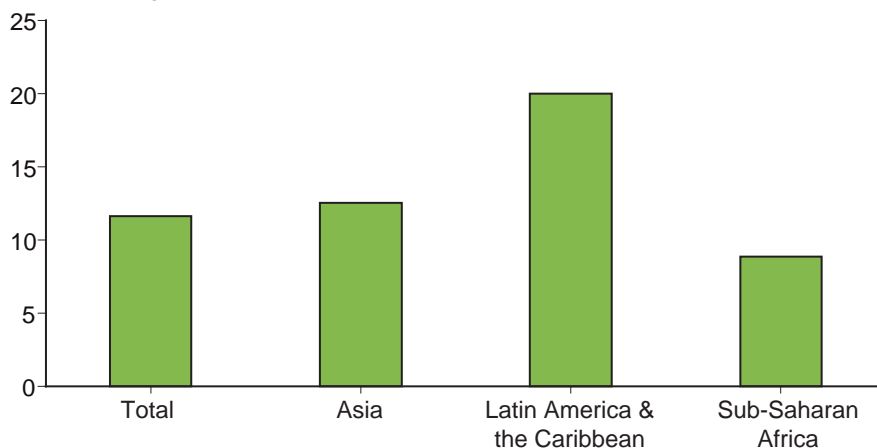
Source: USDA, Economic Research Service.

Figure 5

Change in share of food-insecure population

(Scenario 2 relative to baseline, 2009)

Percent change



Source: USDA, Economic Research Service.

not much higher than the daily requirement of 2,100 calories per day. Many countries in SSA do not have an adequate supply of food, and the inequality in purchasing power exacerbates the problem. The countries that will be hardest hit by the economic crisis are those with large balance of payments deficits and high levels of dependence on food imports. In SSA, many countries have become more dependent on food imports because of a combination of slow domestic production growth, high population growth (SSA has the highest population growth of all the regions), income growth, market liberalization policies, and, more recently, a boost in foreign direct investment. It is the combination of food-import dependence and inability to pay for these food imports that can lead to food insecurity.

In the CIS countries, the impact is projected to increase the number of food-insecure people to 5 million from 2 million in the 2009 baseline. Georgia, already one of the most vulnerable countries in the region, will feel the effect

the most. The increase in current-account deficits in recent years is a factor in this development, as is internal political turmoil.

Overall, the magnitude of changes in food-insecurity indicators under the two scenarios highlights the vulnerability of millions of poor people whose food consumption is at or near basic nutritional requirements. Annually, such vulnerability is intensified either because of internal factors, including weather-related domestic production shortfalls and inadequate domestic policy responses, or external factors such as the global economic shocks currently being experienced. The scenarios also reveal an important aspect of the food-security equation: the critical role trade and capital inflows play in assuring food security in lower income countries with substantial food imports.

For countries where domestic production accounts for most of the food supplies, a reduction in imports will likely have a less direct effect on food security. The indirect effect still could be substantial if imports are generally sold to vulnerable groups or urban populations whose food needs are difficult to supply effectively from local production. Regionally, import dependence on grain, the main staple food consumed by the poor, is lowest in Asia, followed by SSA and CIS, and highest in LAC and North Africa. Most of the LAC and North African countries included in this study import nearly half of their grain supplies. Some countries can forgo imports of other commodities and allocate a larger share of their import budget on food during a crisis period. But for those that were highly food insecure at the outset, like many in SSA, the decline in economic growth and import capacity can have widespread adverse food-security implications.

Continued Food Insecurity in the Long Term

The near- and medium-term food security of countries depends on the depth and the length of the current economic downturn. Tighter credit and weaker global growth are likely to cut into government revenues and investment in areas such as human capital and infrastructure that are essential for sustained growth.

Even under the assumption that the 2009 financial crisis will be followed by a rebound in global economic activities, food security in many lower income countries is expected to remain precarious in the long term. Under the best scenario—a rebound in the global economy in 2010—the number of food-insecure people will remain relatively flat through the next decade, reaching 834 million by 2018. The trends in the two large food-insecure regions of SSA and Asia are projected to diverge: deteriorating food security is projected for SSA, while an improvement is projected for Asia.

Food Security: Regional and Country Perspectives

Asia

In Asia, the increase in the number of food-insecure people of 4 percent from 2007 to 2008 was more a reflection of population growth than deepening food insecurity. The region's food security is largely driven by domestic production performance, and despite the doubling of import volume during the last decade, Asia remains the least dependent of all regions on food imports. While Asia accounted for an estimated 46 percent of the food-insecure people of the 70 countries in 2008, the region accounted for nearly two-thirds of the total population of these 70 countries. In other words, its food-security situation was good in relative terms. Less than 20 percent of the region's population was estimated to consume below the nutritional target in 2008.

Highlighting the importance of national stability, food security will remain precarious in Afghanistan and North Korea because of political problems. Afghanistan is the region's most vulnerable country. Political conflict over the years has devastated the country, creating widespread poverty and food insecurity. Performance of the agricultural sector continues to be influenced by the political chaos, but is also faced with periodic weather-related shocks. Grain production in 2008 is estimated to have declined by 37 percent as a widespread drought reduced crop yields even in irrigated areas. About 10 percent of the country's land is arable, and 40 percent of that is irrigated. However, irrigation infrastructure has deteriorated because of ongoing war and lack of maintenance. Periodic droughts have contributed to overgrazing by livestock, leading to widespread soil erosion. The Government has weak institutional capacity to enforce laws and regulations needed for market transactions such as grading and standards, and it has limited financial capacity to invest in market infrastructure.

North Korea is faced with persistent food shortages. The number of food-insecure people more than doubled between 1995-96 and 2007-08 due to a series of natural disasters and the dissolution of the Soviet bloc, which dried up much needed financial support and resulted in the collapse of the country's economy in the 1990s. In 2008, according to the UN World Food Programme, 40 percent of the country's population or about 9 million people were in need of emergency food aid. Data are sketchy but a decline in agricultural production, coupled with the collapse of the country's economy, has put this country in a chronic state of food shortages. In 2008, despite good weather conditions, the low availability of fertilizer and fuel led to a 27-percent decline in grain production. Most of the country's imports consist of food aid, which might decrease because of the global financial slump and continuing conflict between major donors and the North Korean Government.

The baseline outlook indicates modest improvements in Asia's regional food security for 2009—a 1-percent decline in the number of food-insecure people relative to 2008, but a much higher reduction in the intensity of food insecurity as the distribution gap is estimated to decline 20 percent. This reduction in the gap is mainly due to a recovery in agricultural production in Afghanistan and North Korea after a severe shortfall in 2008. The picture,

however, will likely change given the expected impact of the financial downturn, despite the fact that several large countries such as India and Indonesia entered the year with large cash reserves to compensate for any decline in their import budgets. Most countries in the region have increased their share in global trade and therefore have become more vulnerable to the vagaries of the international economic environment, particularly the import demand of the major developed countries.

Under a scenario of a decline in export growth and a cutback in net capital inflows (Scenario 2), the number of food-insecure people in the region is projected to increase by 13 percent in 2009 relative to the food-security baseline. This increase is principally driven by the impact of this economic shock on Bangladesh and the Philippines.

Bangladesh had made some remarkable achievements in reducing poverty and improving its social and economic situation since the early 1990s. Export earnings grew 13 percent per year (1990-2006) and per capita income grew by 3 percent. However, the country's per capita income remains below \$500 (in 2006) and per capita food consumption is close to the nutritional requirement (2,199 calories per day in 2004). Almost 80 percent of Bangladesh's population lives in rural areas, with 54 percent of them employed in agriculture and the remainder in the rural nonfarm sector. Rural poverty is deep, with more than half of the rural population classified as poor. Urbanization has put pressure on land, leading to a decline of about 1 percent per year in cultivated area. The country's location in the flood plain of three large rivers has meant that 20 to 30 percent (annually), and in some years up to 40 percent, of the country is flooded. This has caused severe damage to crops and market infrastructure despite the Government's extensive investment to protect against floods.

The economic downturn in Bangladesh, reflected in Scenario 2, results in a reduction in food consumption so that 40 percent of the population falls below the threshold of nutritional requirements compared with the 20 percent estimated under the food-security baseline. The Government of Bangladesh can prevent this outcome because of its commitment to provide affordable food prices and to safeguard food security. In 2008, the sharp rise in food prices was in part mitigated by increased food imports and public distribution of food. The long-term food-security challenge for the Government is how, in a fiscally sustainable system, to provide reasonably priced food for the poor while securing incentives to farmers to increase food production. In 2008, in an effort to mitigate the high food prices, the Government increased agricultural input subsidies, including subsidies for diesel, which is widely used by farmers in irrigation.

In addition to Bangladesh, food security in the Philippines is projected to suffer from the decline in export earnings and net inflow of capital, increasing the number of food-insecure people from 10 percent of the population to about 20 percent. It is not certain that this scenario will be relevant because the Government of the Philippines has acted to reduce the impact of higher food prices on consumers in 2008. Among other assistance, the Government provided cash transfers to poor families and provided rice subsidies that were targeted to the poor. In January 2009, the Government announced a \$6.9-billion stimulus package based on the anticipation of

Table 2

Food availability and food gaps for Asia

Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food
1,000 tons					
1999	426,873	18,480	20,691	4,259	546,673
2000	432,739	18,910	16,053	3,070	553,569
2001	435,437	19,310	12,465	4,209	555,263
2002	406,827	19,808	17,637	3,345	559,568
2003	443,663	20,240	17,170	2,379	571,792
2004	441,068	20,913	16,238	2,009	580,661
2005	462,220	21,549	16,369	2,493	594,800
2006	467,907	22,339	25,647	1,397	606,448
2007	483,990	23,582	26,536	1,774	621,166
Projections					
				Food gap*	
				NR DG	
2008	498,850	23,140	19,631	4,716 8,048	627,735
2013	539,595	24,747	25,326	2,246 5,658	677,637
2018	585,777	26,447	31,057	2,746 5,239	731,423

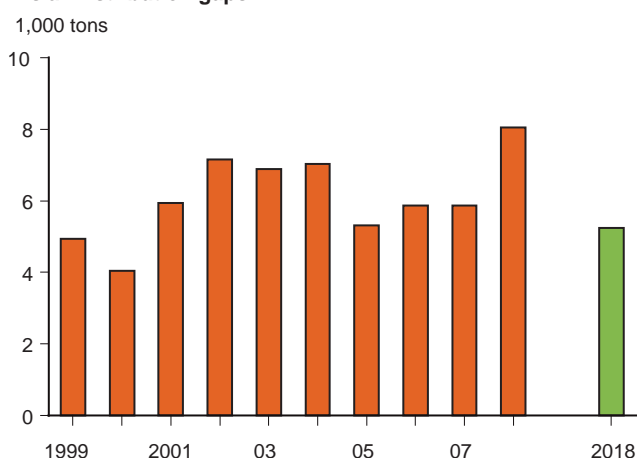
*See table 1.

Asia

(2.03 billion people in 2008)

Asia has made significant gains in increasing food availability. The region's food security is largely driven by domestic production performance, and despite the doubling of import volume during the last decade, Asia remains the least dependent of all regions on food imports.

Afghanistan is the region's most vulnerable country as political conflict has devastated the country. North Korea also is faced with persistent food shortages. The number of food-insecure people in North Korea more than doubled between 1995-96 and 2007-08.

Asia: Trend in number of food-insecure people vs. population**Asia: Distribution gaps****Asia: Capital inflows as share of gross domestic product (GDP) in 2006**

	Export earnings	Remittances*	Foreign direct investment	Sum
Percent				
India	23.0	2.8	1.9	27.7
Indonesia	30.9	1.6	1.5	34.0
Pakistan	15.3	4.0	3.4	22.7
Philippines	46.4	13.0	2.0	61.3
Vietnam	73.5	7.9	3.8	85.1

*Workers' remittances and compensation of employees, received.

Source: World Bank Indicators, 2008.

slower domestic demand growth that in part is due to a decline in remittances and export earnings. The plan is to expand welfare programs including cash transfers to poor segments of the population and to embark on projects that are labor-intensive, such as road maintenance and reforestation, to increase employment among unskilled workers.

The Asian food-security outlook over the next 10 years indicates that just over 20 percent of this region's population will remain food insecure. After averaging 2 percent per year throughout the 1990s, Asia's population growth is projected to slow to about 1.4 percent per year through the next decade, thereby reducing pressure on resources. The expected improvement in the food-security situation in India will be the dominant factor in this projection. In 2000, an estimated 20 percent of India's population fell short of nutritional requirements. By 2018, however, this share is projected to be only 10 percent, or 135 million people. The country's population growth, which averaged about 1.7 percent per year during the 1990s, is projected to average under 1.4 percent during the next decade. The Government of India places a high priority on reducing poverty and improving food security by raising agricultural productivity. The country's economic and trade reforms in the 1990s helped to improve agricultural production incentives, but overregulation of domestic markets has increased costs, limiting incentives in the agricultural sector. The potential to increase food production is large, however. Currently, India's yields for rice, a staple food, are at a level about one-third of China's and one-half of those in Vietnam and Indonesia.

One important factor that can change projection results is the growing income inequality in several countries, including India, Indonesia, and the Philippines. In our projections, income distribution is assumed to stay constant during the next decade. In general, income inequality tends to grow during the industrialization process as skill-based technologies are introduced to the economy. Growing income inequality will not result in any food-security problems as long as income growth benefits all income groups, however.

Commonwealth of Independent States

Due to higher food and fuel prices and a weather-induced sharp decline in food production, the Commonwealth of Independent States (CIS) region, was estimated to have 6 million food-insecure people in 2008, about 8 percent of the region's total population. In an attempt to maintain food security, several countries in the region undertook strong measures to combat high prices. The Government of Kazakhstan, the region's main wheat exporter, introduced export taxes on wheat to protect domestic supplies and to curb food inflation. Other countries adopted measures such as tariff reductions and price ceilings to reduce the impact of higher food prices.

In Georgia, food consumption for the lowest income quintile fell below the nutritional target in 2008, reflecting economic disruption arising from the country's conflict with Russia, continued high food and fuel prices, and the onset of the global economic crisis. According to the *Asian Development Outlook 2008*, gross domestic product (GDP) growth for Georgia in 2008 was 2 percent, the lowest increase since 2000 (Asian Development Bank, 2008). The country is highly dependent on food and fuel imports, so the higher prices resulted in a 20-percent increase in the import bill in 2008. The

Table 3

Food availability and food gaps for Commonwealth of Independent States

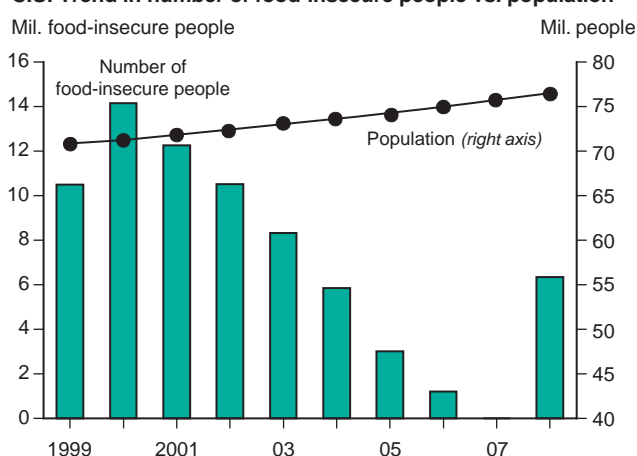
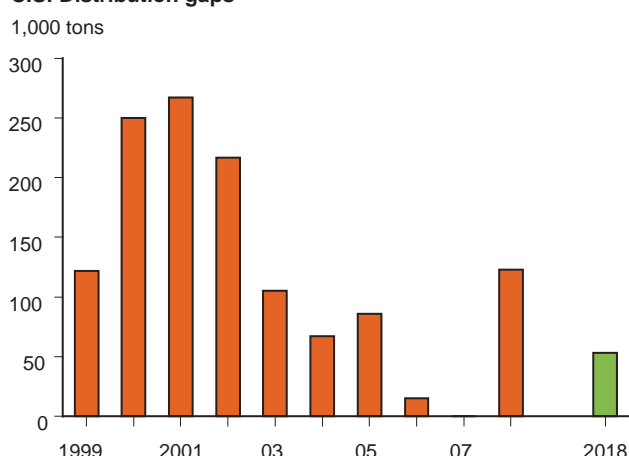
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food
			1,000 tons		
1999	24,346	1,358	3,024	353	22,982
2000	21,434	1,385	3,474	360	22,511
2001	27,050	1,664	2,534	521	22,671
2002	29,532	1,764	2,780	516	22,307
2003	29,056	1,909	2,870	272	21,682
2004	26,757	2,006	3,551	301	22,487
2005	28,954	2,076	4,243	282	26,174
2006	31,502	2,047	4,333	349	27,055
2007	34,539	2,078	4,548	453	26,946
Projections				Food gap*	
				NR DG	
2008	30,418	2,182	6,897	53 123	28,394
2013	32,276	2,331	6,973	0 13	29,508
2018	33,874	2,487	7,993	0 53	32,069

*See table 1.

Commonwealth of Independent States (CIS)
(76 million people in 2008)

Tajikistan was the most food-insecure country in the region in 2008. Eighty percent of the population was estimated to consume below the nutritional target. In 2008, remittances equaled about half of the country's GDP, but this inflow is expected to decline, thereby exacerbating vulnerability to food insecurity.

In Georgia, food consumption for 20 percent of the population fell below the nutritional target in 2008.

CIS: Trend in number of food-insecure people vs. population**CIS: Distribution gaps****Commonwealth of Independent States: Capital inflows as share of gross domestic product (GDP) in 2006**

	Export earnings	Remittances*	Foreign direct investment	Sum
	Percent			
Armenia	22.0	18.4	5.4	45.8
Georgia	32.9	6.3	13.7	52.8
Kazakhstan	51.1	0.2	7.6	59.0
Kyrgyz Republic	39.3	17.1	6.5	62.8
Tajikistan	23.2	36.2	12.0	71.5
Turkmenistan	72.2	--	7.0	79.1

*Workers' remittances and compensation of employees, received.

Source: World Bank Indicators, 2008.

country's balance of trade was also adversely affected by the decline in prices for copper and other metals, some of the country's major exports.

Tajikistan was the most vulnerable country in the region in 2008, with 80 percent of the population estimated to be food insecure. The country is one of the poorest in the region and as a result, nearly half of the population works outside the country, mostly in Russia. In 2008, Tajikistanis working in Russia contributed remittances equal to about half of Tajikistan's GDP. However, as the Russian economy weakened, those remittances slowed at the end of 2008. Cotton is the country's most important crop, providing about 80 percent of the employment in rural areas. It also accounts for 20 percent of the country's export earnings. The sector is highly inefficient, however, and suffers from heavy debt and weak infrastructure. Export earnings for cotton in 2008 were adversely affected by the drop in prices; by the end of 2008, these prices reverted to levels of the mid-2000s.

Many of the countries in this region are highly dependent on earnings from oil exports and remittances. In 2007 and 2008, when these factors were strong, growth in the region was equally robust. According to the IMF, economic growth measured 8.6 percent in 2007 and 6 percent in 2008, far outstripping the world average growth. As these indicators weaken, however, so too does the region's growth. In November 2008, the IMF estimated the region's growth for 2009 to be 3.2 percent, and, by January 2009, that estimate was lowered to about 1 percent, reflecting the lower oil prices as well as the decline in remittances.

Baseline results of the food security model indicate that the region's food-security situation will improve in 2009 and the number of food-insecure people and the distribution gap are estimated to decline. However, these results are based on a continuation of trend indicators. Under Scenario 2, where export earnings and capital inflow are cut, the food security of Georgia and Tajikistan are projected to worsen.

These cuts in financial capacity have by far the greatest impact on Georgia, already one of the vulnerable countries in the region. In the baseline estimates, 20 percent of the country's population is considered food insecure in 2009. Under Scenario 2, that number jumps to 80 percent. In other words, when export earnings growth and capital inflow are cut, only the top 20 percent of the population is estimated to be food secure. This result is largely driven by the fact that import capacity becomes limited under these financial conditions. Since imports generally contribute to 60 percent of the country's grain supplies, a severe cut can adversely affect food security.

In the long term, 40 percent of Tajikistan's population is projected to be food insecure in 2018—the highest rate of all the CIS countries. The country's economy depends heavily on remittances, making Tajikistan highly vulnerable to the health and political stability of neighboring countries. As for other countries in the region, strength of commodity prices and global demand will be a significant factor in their continued food-secure position given their strong reliance on oil and other metals for much of their export earnings.

Latin America and the Caribbean

The Latin America and Caribbean (LAC) region experienced the largest increase in food-insecure people—more than 14 percent—between 2007 and 2008. This increase was largely due to a cut in commercial import capacity due to declining terms of trade. As a result, the share of food-insecure people in the region rose from less than 28 percent to more than 31 percent. However, more important than the increase in the number of food-insecure people was the 30-percent increase in the distribution gap. This means that food insecurity not only became more widespread, but its intensity grew. The region depends heavily on imports of grains and vegetable oils. Grain imports increased from about 30 percent of domestic supplies in the early 1980s to around 50 percent in recent years. Food aid historically accounted for a large share of imports, peaking at above 40 percent in 1987, but the region's dependence on food aid has declined as strong economic growth lifted large numbers of people out of poverty. Food aid is still important in Haiti, the poorest country in the hemisphere, and becomes important throughout the region at times of natural disasters. Food aid accounted for only 3 percent of total imports in the last 3 years. The region's dependence on imports made it difficult to shield consumers from rising grain prices.

The LAC region mostly consists of lower middle income countries, except for Jamaica, which is classified as upper middle income and Haiti, the only low-income country in the Western Hemisphere. While average national incomes seem sufficiently high in all the LAC countries to prevent a slide into food insecurity in times of crises, income distribution is unequal within the nations, meaning that a large share of the region's population lives in poverty and is highly vulnerable to escalating food inflation.

In 2008, Ecuador, the Dominican Republic, Honduras, Jamaica, and Nicaragua experienced decreases in food consumption that resulted in increased numbers of food-insecure people. It should be noted that even though our model did not detect an increase in the share of food-insecure people in the other countries, it did find a decline in food consumption in every country in the region between 2007 and 2008.

The food-security baseline projections for 2009 show little change in food security assuming stable export revenues, capital inflows, grain prices, and adequate domestic production. However, if we assume a reduction in export earnings growth and capital inflows (Scenario 2) noticeable food-security impacts are projected that will lead to increases in the number of food-insecure people in El Salvador, Guatemala, Haiti, Honduras, Jamaica, and Nicaragua, all countries that are highly dependent on export earnings or remittances to help finance their food imports. As a consequence of the global economic downturn, LAC countries may find it difficult to finance necessary imports. All forms of capital inflows are likely to contract, including: export revenues due to lower commodity prices and demand; foreign direct investment due to uncertainty and lack of credit; and remittances, as many of those sending money from abroad will incur losses or lose their jobs in the wave of rising unemployment around the globe.

Remittances, in particular, are of crucial importance to the Central American and Caribbean countries, accounting for close to 17 percent of GDP in 2006.

In Honduras and Haiti, remittances accounted for around one-quarter of GDP. A drop in remittances has its most severe effect on poor households that depend on income from earners in other countries for their livelihood. A decline in remittances is expected to adversely impact food security.

Haiti continues to be the most food-insecure country in the Western Hemisphere. Up to 80 percent of the population is estimated to consume less than nutritionally required levels for food security. Therefore, in 2008, Haitians were strongly affected by rising rice and fuel prices. The Government, with the help of the IMF, provided temporary subsidies on the price of rice as well as targeted assistance to the most vulnerable part of the population through school feedings and public works employment. The Government also initiated programs to stimulate domestic production. However, the steady decline of agricultural production in Haiti, food as well as cash crops, is difficult to reverse. To improve Haitian competitiveness, investment in infrastructure and improved access to inputs will be needed.

Export earnings in the region started to decline in the second half of 2008, and by November of that year the annualized 3-month decline in merchandise export value was close to 40 percent (International Monetary Fund, May 2009). Several LAC countries export oil, minerals, or metals and the dramatic slide in the prices of these commodities seriously strains the countries' ability to import and finance domestic support programs. Ecuador, for example, depends heavily on oil revenue, which is expected to decline in 2009 to 28.8 percent of GDP compared to 43.2 percent in 2008 (*The Economist*, 2009). Peru has enjoyed a prolonged period of strong economic growth and so far the country appears less affected by the global crisis than its neighbors, despite Peru's dependence on copper and zinc exports. Peru's exports have become more diversified in the last 10 to 15 years, which makes the country less vulnerable to price declines in selected export commodities. Peru has attracted foreign direct investment (FDI), \$2 billion in 2007, and in 2008 the country was awarded an investment-grade credit rating. February 2009 marked the start of the Peru Trade Promotion Agreement (PTPA), a comprehensive free trade agreement between the United States and Peru. PTPA is expected to stimulate trade. While GDP growth in Peru is not expected to continue at recent years' high rates, it is still expected to exceed 3 percent.

Some countries in the LAC region are less dependent on oil, metal, or mineral exports. Nicaragua exports fishery products and shrimp in addition to the traditional exports of coffee and bananas and has been deriving more and more income from tourism. Tourism also has become a leading industry in the Dominican Republic, but that industry in both countries is certain to experience a downturn in the coming year.

Without any major effort to reduce poverty, in the long run (by 2018), food insecurity in the region is projected to remain close to current levels, affecting about 33 percent of the population. The number of food-insecure people is projected to increase slightly, mostly driven by Guatemala, while food gaps are projected to decline over the next decade. Given the poverty of the lowest income groups, it will take a long time to ensure access to sufficient food for all people.

Table 4

Food availability and food gaps for Latin America and the Caribbean

Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food
1,000 tons					
1999	13,977	3,599	9,711	1,178	38,222
2000	14,856	3,728	10,209	887	39,653
2001	14,940	3,681	11,125	1,067	40,469
2002	15,437	3,737	11,680	1,127	40,432
2003	16,815	3,416	11,774	491	40,785
2004	16,822	3,437	12,055	568	42,049
2005	17,505	3,589	13,412	688	46,193
2006	16,965	3,524	14,832	671	47,457
2007	16,630	3,662	15,783	392	48,247
Projections	Food gap*				
				NR DG	
2008	18,012	3,703	12,849	323 1,868	45,921
2013	19,352	3,943	15,336	94 1,619	51,713
2018	20,586	4,198	17,024	0 1,429	57,075

*See table 1.

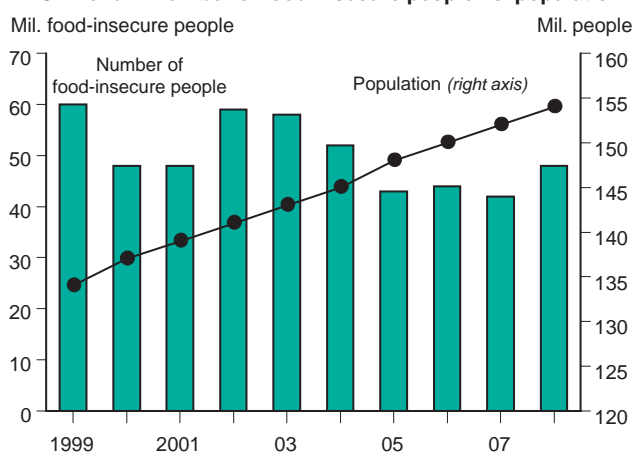
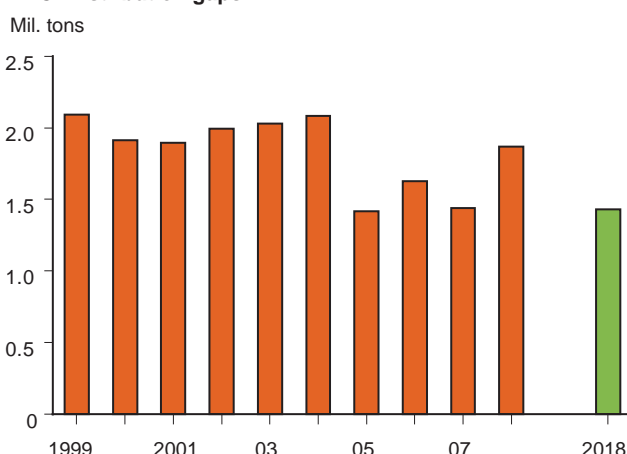
Latin America and the Caribbean (LAC)

(154 million people in 2008)

The global economic downturn is affecting food security in those countries in the region that depend most heavily on exports and capital inflows to pay for crucial imports.

In Haiti, where 80 percent of the population is food insecure, targeted food-security policies were implemented with the goal to dampen the effect of price hikes and reduction in remittances.

Food security is expected to improve slightly over the next decade.

LAC: Trend in number of food-insecure people vs. population**LAC: Distribution gaps****Latin America and the Caribbean: Capital inflows as share of gross domestic product (GDP) in 2006**

	Export earnings	Remittances*	Foreign direct investment	Sum
Percent				
Ecuador	34.3	7.1	0.7	42.0
Haiti	14.1	21.5	3.2	38.8
Honduras	40.8	25.6	4.2	70.6
Jamaica	45.8	19.4	8.8	74.0
Nicaragua	31.1	12.4	5.3	48.8
Peru	28.7	2.0	3.8	34.5

*Workers' remittances and compensation of employees, received.

Source: World Bank Indicators, 2008.

North Africa

North Africa continues to be the most food-secure region among the five regions studied in this report. Food consumption levels continue to be high, despite higher food prices and consequently higher import bills than in recent years. Per capita food consumption in North Africa, at more than 3,000 calories per day, is close to that in high-income countries and far above consumption levels in other developing countries. Even so, higher global food prices in 2008 had an impact in this food-secure region as average per capita food-consumption levels declined by more than 10 percent from 2007 levels. Projections for 2009 hint at a slight decline in food security that could become more severe if the cuts outlined in Scenario 2 occur. North Africa's dependence on export earnings and capital inflows to finance food imports means that a decline in these factors would have an impact on food security. Such a decline likely would lower food-consumption levels of the poorest segments of the population to a level that barely exceeds the nutritional requirements.

In the long run, food security in North Africa is expected to deteriorate, with per capita consumption levels projected to decline 4.4 percent between 2008 and 2018. But there are differences among the countries. Morocco and Tunisia are expected to improve, while Algeria is projected to deteriorate slightly if foreign exchange availability does not recover. Egypt, the most populous country in the region, is projected to experience the largest decline in consumption, 15 percent over the next 10 years. The lowest income group in Egypt is in danger of becoming food insecure.

Domestic grain production in North Africa is highly variable due to undependable rainfall, except in Egypt, where production is mostly irrigated and therefore much less variable. Production variability, as measured by the coefficient of variation, averaged 44.3 between 1990 and 2008 in Algeria, Morocco, and Tunisia, more than any other region (the average coefficient of variation is 20.9 in CIS, 19.5 in SSA, 12.1 in LAC, and 9.9 in Asia). Despite its relative stability, production in Egypt is constrained from increasing because of limited availability of irrigated area. Due to these factors, the region has for decades been dependent on imports, which average close to half of total grain supplies. Imports vary considerably from year to year as they fluctuate with domestic production. They peaked in 2000, when more than 53 percent of total grain supplies came from imports. Vegetable oils, another important part of daily diets, are mostly imported, with just 10-20 percent of overall use coming from domestic production. Governments in the region have been trying to reduce their dependence on food imports by implementing policies that encourage increased domestic production.

In Tunisia, for example, policies to ensure food security include incentives to improve domestic grain production. Farmgate prices for wheat and barley were raised about 60 and 100 percent. In addition, farmers benefited from improved credit terms and less expensive feed imports for the livestock sector as tariffs and other import duties were waived. Despite the incentives, Tunisia's grain crop declined from 2007 to 2008, and imports exceeded 2007's record levels. Insufficient rainfall may result in another below-average crop in 2009. As a result of higher food prices, about 1 million people or 10 percent of the population were estimated to be food insecure in 2008.

Table 5

Food availability and food gaps for North Africa

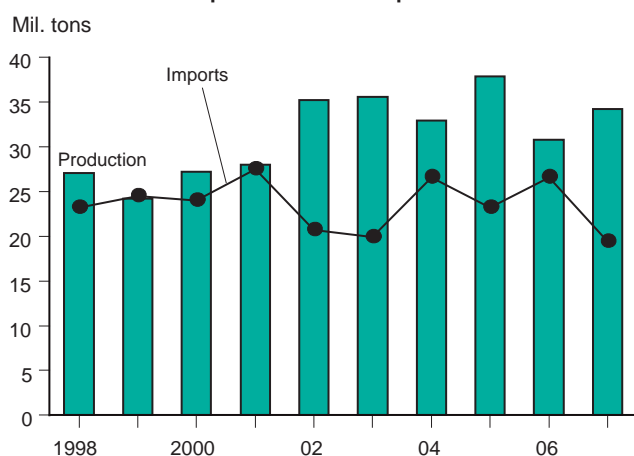
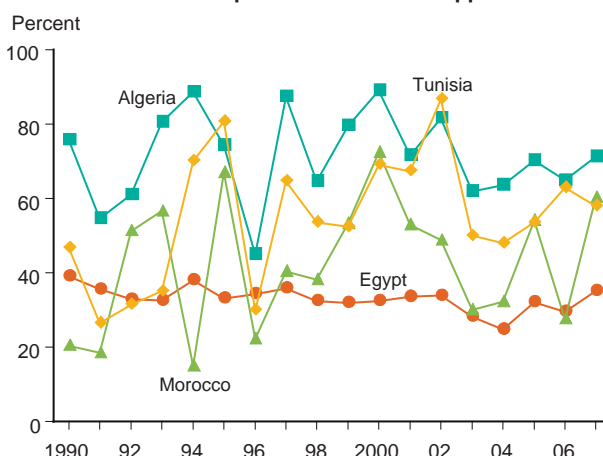
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food	
1,000 tons						
1999	38,222	1,287	23,233	105	49,844	
2000	39,653	1,312	24,530	356	50,786	
2001	40,469	1,329	23,996	82	51,543	
2002	40,432	1,483	27,456	72	52,594	
2003	40,785	1,704	20,730	35	56,455	
2004	42,049	1,885	19,855	58	58,062	
2005	46,193	1,928	26,605	53	60,974	
2006	47,457	1,995	23,239	56	63,493	
2007	48,247	1,898	26,588	51	60,613	
Projections				Food gap*		
				NR	DG	
2008	34,213	2,037	24,132	0	0	57,943
2013	38,107	2,222	25,097	0	0	60,591
2018	41,152	2,418	25,184	0	0	60,558

*See table 1.

North Africa
(153 million people in 2008)

Rising food prices in 2008 led to consumption declines in North Africa. However, food security was not threatened, in part thanks to government policies that helped keep prices of bread and other important staples at pre-crisis levels.

The global economic downturn is expected to dampen growth prospects of North Africa given sharp declines in export earnings. These are crucial for financing imports, which have accounted for about 50 percent of the region's grain supply.

North Africa: Grain production and imports**North Africa: Grain imports as a share of supplies****North Africa: Capital inflows as share of gross domestic product (GDP) in 2006**

	Export earnings	Remittances*	Foreign direct investment	Sum
Percent				
Algeria**	47.8	1.9	1.1	50.8
Egypt	29.9	5.0	9.3	44.3
Morocco	33.0	8.3	4.1	45.5
Tunisia	54.4	5.0	10.8	70.2

*Workers' remittances and compensation of employees, received.

**Data for 2005.

Source: World Bank Indicators, 2008.

The countries' governments also are heavily involved on the consumer side. In Morocco, in 2008, the Government attempted to pass higher food import prices on to consumers, but local unrest and heavy media criticism caused the Moroccan Government to back down from its attempt. A number of policies were implemented to maintain bread prices at pre-crisis levels, such as the elimination of import duties on wheat and the fixing of wheat and flour prices well below international levels. Import duties on feed also were phased out to help the livestock industry keep retail prices low. These policies presented a heavy burden on the country's finances. Similarly, in Algeria, in 2008, the Government allocated \$2.5 billion to support staple food prices and thus protect household incomes. Ceilings on bread and bread flour prices have been in place for decades. Weather conditions have been favorable for the last 3 years and are expected to remain so in 2009.

Egypt, the most populous country in the region with close to 80 million people, imported 12 million tons of grain in 2008, which is close to 34 percent of that nation's grain supply. The high prices made it necessary for the Egyptian Government to more than double the budget for bread price supports to \$1.5 billion in FY 2007/08 (Oct. 1, 2007-Sept. 30, 2008).

The price-support policies are putting a strain on government budgets in North Africa. The worldwide recession coupled with falling commodity prices is expected to decrease export earnings dramatically, thus making it harder to finance expensive domestic programs. Algeria and Egypt will receive less revenue on their oil exports and Morocco's earnings will suffer due to the decline in the price of phosphate rock. The sharp decline in oil prices will have a dramatic negative impact on the finances of the Algerian Government, which in 2008 depended on oil for 90 percent of its export revenue. Egypt's oil exports accounted for 46 percent of its total exports in 2007. The IMF projects a 0.8-percent decline in export earnings for emerging and developing countries in 2009. As mentioned above, the tighter budget conditions, if unaddressed, could lead to food insecurity in Egypt by 2018, threatening to prevent the lowest population quintile from having access to a nutritionally adequate diet.

Sub-Saharan Africa

Sub-Saharan Africa's food security deteriorated between 2007 and 2008, despite higher than normal grain production across much of the region. The region remains the most vulnerable of the five regions to food insecurity, as roughly half of the region's population is estimated to be food insecure. In contrast to Asia, Sub-Saharan Africa accounts for only a quarter of the population of the 70 countries, but its share of the number of food-insecure people is 47 percent.

The region's distribution gap was estimated at more than 14 million tons in 2008. To put this number in perspective, the region generally receives about 4 million tons of food aid, in grain equivalent, per year.

SSA has become increasingly dependent on imports of grain, a staple of the region's diet. In the late 1980s, imports accounted for around 10 percent of the region's grain supplies. In recent years, this share has consistently exceeded 20 percent. Therefore, when international prices rise, the ability

to import is likely to fall given the limited financial capacity of the region. Grain prices started to rise in 2002 and continued to rise through early 2008 before falling off in late 2008. The expected impact of this price increase was offset by above-average or record grain production in many SSA countries in 2008. As a result, the number of food-insecure people in the region remained flat between 2007 and 2008.

Somalia and Zimbabwe were estimated to be the most food-insecure countries in the region in 2008 as consumption in all income groups fell well below the nutritional target. These two countries have been characterized by unstable political situations that have disrupted agricultural activities. Somalia has endured nearly 20 years of civil strife since its Government collapsed in 1991. The country's grain production averages about one-quarter to one-third of the levels achieved prior to that time. Consumption in even the highest income group was estimated at less than two-thirds of the nutritional requirement in 2008.

Zimbabwe, which had been a net exporter of grains until the 2000s, now imports roughly 500,000 tons of grain per year. The country's persistent political and economic difficulties have resulted in extreme shortages of seeds and other inputs. Lack of foreign exchange precludes the importation of fertilizer as well as the raw materials to produce fertilizer domestically. Hyperinflation has cut purchasing power of consumers who were already financially unstable. These factors have resulted in declining per capita food consumption. Many Zimbabweans are even cutting down on the number of meals eaten per day.

Without any increase in external assistance, SSA food security is expected to deteriorate in 2009. ERS analysis shows that the number of food-insecure people will increase 5.5 percent in 2009 to 406 million (food-security baseline estimate). The distribution gap is projected to remain virtually unchanged at less than 15 million tons. The disparity in these growth rates indicates that food insecurity will spread among the region's population, but, on average, not deepen among those who had been consuming below the nutritional target. The deterioration between 2008 and 2009 is likely a reflection of production returning to trend levels as opposed to the above-average output levels of 2008.

Another factor adversely affecting consumers in 2009 is high prices. Despite the decline of prices on the world market in the later part of 2008 and early 2009, prices in many countries in this region remain high. According to the United Nations' Food and Agriculture Organization, millet prices in January 2009 were 25 percent higher than they were in January 2008 in Burkina Faso (UN, FAO, February 2009). In Niger, these prices were 40 percent higher. In Senegal, the price of rice, a diet staple, was 80 percent higher in November 2008 than it was earlier in the year. Kenya was one Sub-Saharan country that did not have a good 2008 crop. In fact, grain output fell more than 20 percent. As a result, the price of corn, the country's staple food, in January 2009 was nearly 50 percent higher than the January 2008 price. While prices in Ethiopia have fallen considerably in recent months, reflecting the good 2008 crop, food prices remain well above last year's level. Wheat prices, for example, were about 50 percent higher in January 2009 than January 2008. Corn prices were 13 percent higher.

The financial downturn is expected to weaken the food security of the region further by exacerbating the impact of the food and fuel price shocks of 2006-08 that accelerated inflation and deteriorated the financial position of these countries. The metal- and oil-exporting countries have been hit by the recent decline in those prices. On the other hand, the benefits of the lower oil prices for importing countries were negated by the more rapidly declining prices for their export commodities such as coffee, cocoa, and cotton.

IMF projects a decline in all sources of foreign exchange including tourism, foreign direct investment, remittances, and external aid (IMF, *Impact of the Global Financial Crisis on Sub-Saharan Africa*, January 2009). In terms of food security, under Scenario 2, which represents slower export growth and a cutback on net inflow of capital, the number of food-insecure people is projected to increase by 9 percent from the 2009 food-security baseline. The distribution gap is projected to rise by 11 percent meaning that, in addition to an increase in food insecurity, food insecurity also will intensify. The countries that will be affected most are countries that have done well economically in recent years such as Angola, which benefited a great deal from high oil prices, and Cape Verde, Côte d'Ivoire, Lesotho, Mauritania, and Senegal, because of their growing import dependence. In addition, the financial slump will further deteriorate food security of highly foreign-aid-dependent countries such as Eritrea, Somalia, and Sierra Leone.

According to the IMF report, "the slump in global growth could persist longer and the impact of the slow down could be more pronounced than expected, negatively affecting Sub-Saharan Africa's internal and external equilibrium." However, under the positive assumption of full economic recovery in 2010, the region's food security is projected to remain virtually unchanged over the next decade. The number of food-insecure people is projected to increase at roughly the same rate as the increase in overall population. However, relative to other regions in this report, the situation is projected to deteriorate. In 2008, the region was estimated to account for 47 percent of the food-insecure people in the 70 countries. In 2018, this share is projected to jump to more than 57 percent.

Sub-Saharan Africa receives more food aid than any other region and its share of the world total has grown over time, from roughly a third to well over half. While global food aid levels have trended downward over time, Sub-Saharan Africa's food aid receipts, although fluctuating from year to year, have remained relatively flat. In 2006-07, the region received about 3.5 million tons of food aid per year. The composition of food aid has changed over time. About a decade ago, over half of the aid was for emergency purposes, more than a quarter was project aid, and about a fifth was program aid. Project food aid is nonemergency aid that can be targeted to needy groups or monetized (sold on the open market). Program food aid is government-to-government donations that are sold in the recipient country markets. These open-market sales can distort local markets and provide disincentives to local producers. More recently, 75 percent of the aid was for emergency purposes while only 20 percent was project aid. There is a very small amount allocated to program aid. These trends somewhat mirror global trends, but in the case of Sub-Saharan Africa, aid for emergency purposes predominates.

Table 6

Food availability and food gaps for Sub-Saharan Africa

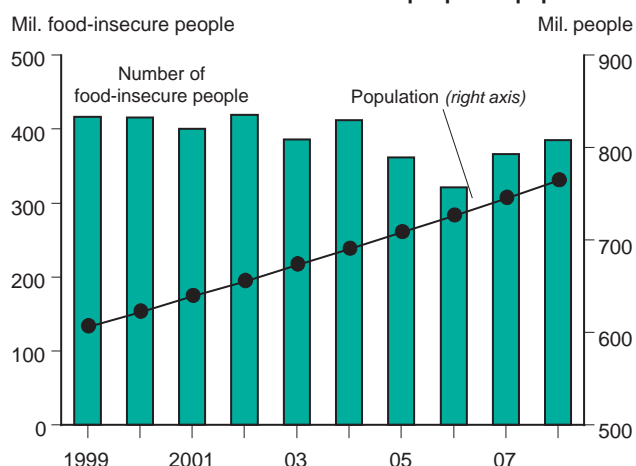
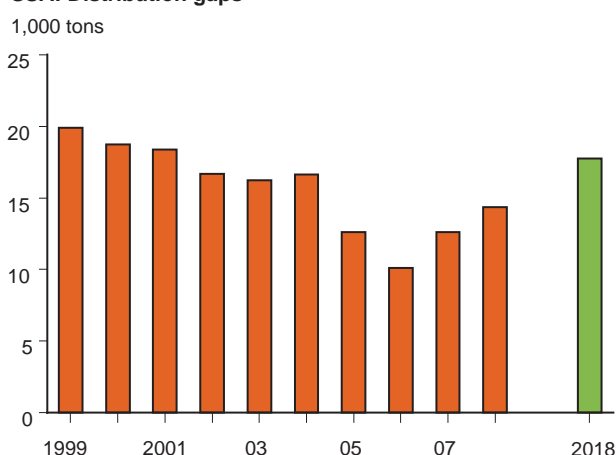
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food
1,000 tons					
1999	76,637	44,236	9,850	2,690	151,767
2000	72,750	45,542	11,554	4,027	158,690
2001	78,420	47,263	13,166	3,722	163,535
2002	76,324	48,744	15,118	3,225	170,098
2003	85,394	50,309	14,626	5,422	177,831
2004	84,663	52,913	16,270	3,717	181,294
2005	94,229	55,172	18,213	4,872	195,084
2006	102,792	57,271	18,610	4,223	208,094
2007	107,698	57,273	18,756	3,204	214,387
Projections				Food gap*	
				NR DG	(w/o food aid)
2008	110,675	58,577	15,410	6,307 14,368	210,428
2013	124,518	64,051	17,949	5,775 15,441	236,724
2018	141,084	69,965	19,694	7,428 17,738	264,563

*See table 1.

Sub-Saharan Africa (SSA)
(764 million people in 2008)

Sub-Saharan Africa (SSA) is the world's most food-insecure region. Half of the region's population was estimated to consume below the nutritional requirement of 2,100 calories per capita per day in 2008.

The financial downturn is expected to weaken the food-security situation of the region further by exacerbating the impact of the food and fuel price shocks of 2006–2008 that accelerated inflation and deteriorated the financial position of these countries.

SSA: Trend in number of food-insecure people vs. population**SSA: Distribution gaps****Sub-Saharan Africa: Capital inflows as share of gross domestic product (GDP) in 2006**

	Export earnings	Remittances*	Foreign direct investment	Sum
Percent				
Gambia, The**	44.8	12.4	11.3	68.5
Kenya	26.2	5.0	0.2	31.4
Madagascar	29.7	0.2	4.2	34.1
Nigeria	56.3	2.9	4.7	63.9
Uganda	14.9	8.6	4.2	27.7
Zambia	38.2	0.5	5.4	44.1

*Workers' remittances and compensation of employees, received.

**Data for 2005.

Source: World Bank Indicators, 2008.

Ethiopia is the largest recipient of aid in the region, accounting for roughly 20 to 25 percent of the total. Despite strong growth in grain output during the last few years, consumption for many people in this poor country still falls well below the nutritional requirements. According to ERS estimates, 60 percent of the country's population was food insecure in 2008. Aid to Sudan has grown over time in response to the country's persistent political problems, which have displaced large segments of populations. Food aid to Sudan now accounts for 15 to 20 percent of Sub-Saharan Africa's total food aid receipts.

SSA will remain the most vulnerable region in 2018 with 25 percent of the population of the 70 countries and 57 percent of the food-insecure people. Several countries such as Somalia and the Democratic Republic of Congo are likely to remain politically unstable, as they continue to be plagued by disastrous armed conflicts that have caused catastrophic breakdowns of law and order. The resulting social dislocation, food insecurity, and famine preclude any optimism for the future. In other countries in the region, overcoming chronic food insecurity is difficult given the recent high food prices that increased their trade deficits.

Lagging agricultural productivity also is preventing progress. Agriculture is a major source of employment in many countries and therefore is the key to achieving both poverty reduction and increased food security. Since 1990, SSA had the highest growth in grain production of the regions studied—2.8 percent per year—but this growth was offset by SSA's high population growth of 2.7 percent per year. Population growth in the other regions ranged from 0.7 percent to 1.9 percent per year. In SSA, nearly 90 percent of the growth in production came from area expansion during the last couple of decades. The region's yields are the lowest in the world, measuring about a third of the world average. This means that most countries are far from their maximum potential for growing crops, even using existing technologies.

During the last two decades, despite the adoption of policies to encourage economic openness in many lower income countries, economic signals have not been fully transmitted from the global level to producers. While these weak linkages buffer the rural communities from global economic downturns to some extent, they also limit the benefits of an economic upturn. For example, the rising food prices of 2002-08 should have improved production incentives in the agricultural sector, but supply responses were minimal in most SSA countries. An ERS study of five SSA countries (Ghana, Kenya, Mozambique, Senegal, and Uganda) showed that a variety of factors mitigated a local supply response to the higher prices, including rising costs of imported inputs and transportation and infrastructure constraints (USDA, ERS, 2008). These higher prices were, however, transmitted to consumers in most cases. In some instances (Mozambique and Senegal), governments did intervene to counter the higher consumer prices, but in all instances, consumers experienced significant price increases.

The World Bank's *World Development Report 2008: Agriculture for Development* emphasizes the need to increase investment in agriculture. The discussion of Africa, both in the short and long term, focused on the need to increase agricultural productivity by improving soil fertility. This would be achieved by increasing fertilizer use which is currently less than 10 percent of the level used per unit of land than in other developing regions. Most least

developed countries (LDCs) are in the early stages of adopting new agricultural technologies and the potential to increase productivity is enormous. But sustained agricultural growth requires substantial investment in irrigation, rural infrastructure, human capital, and institutions, not just access to basic inputs.

On a positive note, economic growth in the region has been quite strong over the last decade and has even outstripped growth in the rest of the world since 2000. According to the IMF, real GDP growth averaged nearly 5 percent per year between 1995 and 2007 (IMF, *Regional Economic Outlook, Sub-Saharan Africa*, October 2008). This growth has been largely achieved in countries with political and economic stability. Sustaining this growth during the current global economic crisis and associated decline in demand in the developed world may prove difficult. However, to have any hope of improvement in their status, these countries must continue to invest in infrastructure, support agricultural research and extension services, and eliminate price and trade controls that often weaken production incentives.

Conclusion: Challenges and Opportunities

The slow pace or lack of progress in improving food insecurity in lower income countries raised concerns even before the current economic downturn. While the full consequences of the current global economic downturn are not known, for lower income countries food-security problems are expected to worsen. The short-term concern is that these countries have very few domestic safety net programs in place. The international safety nets that do exist are inadequate for stabilizing food supplies for the more vulnerable countries. Food aid has been the primary safety net, but is not sufficient to meet estimated needs around the world. Food-security safety net programs such as Progresá (Programa de Educación, Salud y Alimentación) in Mexico and the Public Food Distribution System in India can play a major role in reducing the impact of economic shocks. Integrating international and national resources to design these safety net programs can be very effective for mitigating the effects of shocks and in this way serve as adjuncts to longer term food-security strategies. The challenge, however, is to design efficient programs that minimize costs, while working toward longer term solutions.

Another concern is the linkage between food insecurity and political unrest, with human costs that are staggering. Establishing the causal relationship between food insecurity, poverty, and political unrest is not straightforward, but the experience in a number of food-insecure countries indicates that political instability often emerges in poorer countries where the safety net programs are weakest.

In sum, food security is one of the foundations for “social security.” Short-term food insecurity mitigation and prevention should be combined with long-term food-security strategies.

An important step in this direction is to expand the use of new technologies to improve productivity and increase farm income and assets, thereby enhancing the capacity to cope better with food-supply shocks. For example, in Sub-Saharan Africa in particular, there is significant potential to increase food production through relatively simple means such as increased fertilizer use or improved seeds.

In addition to increasing the productivity of the agricultural sector, support for rural development provides nonfarm employment and an opportunity for rural communities to diversify their sources of incomes, leading to higher incomes and greater stability. The World Bank has recently devoted much attention to the issue of rural development. Currently, many countries in Latin America and Africa are facing growing unemployment in rural areas because of the reduction in international migration. Agricultural laborers in these countries, in general, have few skills or job opportunities. Developing rural markets will create a low-risk environment that is essential for sustainable economic growth that can improve food security.

Developing Countries Face Urbanization Growth, Food-Security Worries, and Food-Safety Challenges

Shahla Shapouri and Stacey Rosen

For the first time in history, more than half of the world's population lived in urban areas in 2008 (UN Population Fund, 2007). This urban population is projected to increase from 3.3 billion in 2008 to nearly 5 billion by 2030. In the beginning of the 20th century, the urban population was only 220 million, compared to a total global population of 1.65 billion. Regionally, the highest urbanization growth is taking place in Asia and Sub-Saharan Africa where urban population is projected to double from 2000 to 2030 (fig. A-1). The high rate of growth has raised concerns among policymakers and aid donors, some of whom believe that this trend will exacerbate poverty and food insecurity in big cities. The questions that arise when examining these trends are:

- what are the factors behind such high rates of urban growth?
- what are the economic and food-security implications of this growth?
- what challenges and policy options lie ahead as an increasing share of the world's population resides in urban areas?

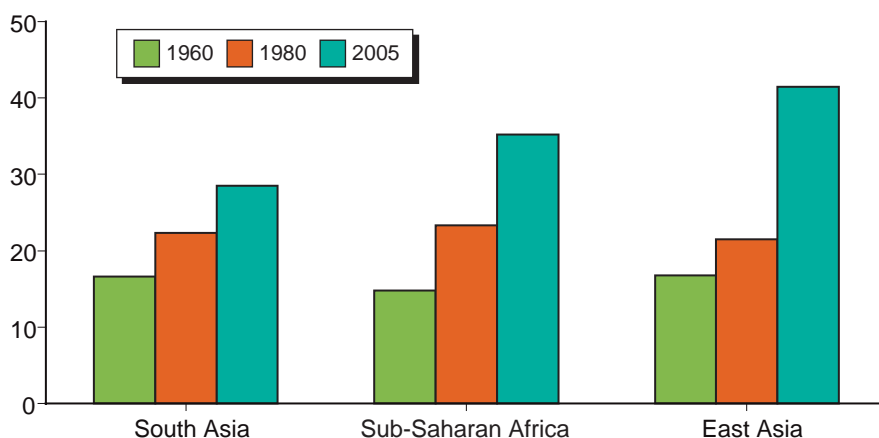
Why Urban Growth Is High

The history of developed countries shows that urbanization has been a key step in their economic development. During the transformation of countries from rural to urban economies or from agricultural-based to industrial- and service-based economies, the demand for agricultural labor has fallen, while labor productivity both in the agricultural and nonagricultural sectors

Figure A-1

Urban population

Percent of total



Source: World Bank, World Development Indicators 2008.

has risen. This change led to higher incomes and reduced poverty for the remaining rural workers.

The experience of developed countries indicates that proximity to and high concentration of populations in urban areas led to higher living standards as costs of providing services were lower than in rural areas. Other factors contributed to this outcome, including improved access to education and diversity of employment opportunities in the urban areas. There are developing-country experiences that illustrate the positive impact of urbanization on economic growth. A World Bank study of Asian countries (Cambodia, Indonesia, Mongolia, the Philippines, and Vietnam) showed that urban activities were the engine of growth accounting for 70 percent of growth in those countries during the last couple of decades (World Bank, *An East Asian Renaissance: Ideas for Economic Growth*, 2007). One potential positive outcome of urbanization growth is the augmentation of rural incomes as migrant workers in the urban areas send remittances home.

The high urbanization growth in many developing countries, especially the lower income ones, is taking place at a time when the availability of nonfarm jobs is limited. In fact, according to a United Nations Conference on Trade and Development (UNCTAD) study, nonfarm productivity in the least developed countries declined 9 percent from 1980-83 to 2000-03. (UNCTAD, *The Least Developed Countries Report: Developing Productive Capacity*, 2006). However, it is likely that the developed countries' experiences (i.e., upward social and economic mobility) created a positive perception for developing countries of urban living compared with rural areas.

The classical models of rural-urban migration are based on rising agricultural productivity that leads to declining demand for agricultural labor. In the case of many developing countries, low agricultural productivity is driving rural-urban migration. A clear example of this case is the high rate of urbanization that took place in Sub-Saharan Africa during the 1980s and 1990s, a time of low or even zero agricultural and economic growth. In this region, urban growth is driven by stagnant agricultural productivity and the poor state of rural living conditions. The situation is not unique to SSA, as rising populations, the decline in available farmland, and inequities in land holding are encouraging landless populations to migrate to cities in search of jobs in many lower income countries. According to UNCTAD, in 2000-03 the average farm size was less than 1 hectare in 33 of the 50 poorest countries in the world. In addition, increased populations have forced farmers to move to marginal lands where productivity is lower. As a result, agricultural labor productivity early in this decade was less than it was two decades ago in one-third of these countries (UNCTAD, *The Least Developed Countries Report: Developing Productive Capacity*, 2006).

Rising Urban Poverty Is a Threat to Food Security

At the aggregate level, economic and social conditions in urban areas are much better than those in rural areas. But aggregate figures do not account for inequality within the urban population that is generally much greater than within the rural areas (World Bank, *World Bank Development Report*, 2000). According to FAO, these aggregate data mask the deep food-insecurity and hunger issues in urban areas, which remain under-reported problems

(UN, FAO, 2004). Unlike in rural areas, food-insecurity problems in urban areas are not related to a lack of available food. Instead, they are related to inadequate purchasing power. High income inequality in urban areas is the reason that more than half of the urban population is below the poverty line in developing countries with varying income levels, such as Angola, Armenia, Azerbaijan, Bolivia, Chad, Colombia, Georgia, Guatemala, Haiti, Madagascar, Malawi, Mozambique, Niger, Sierra Leone, and Zambia.

About 90 percent of the world's slums are in developing countries, with the largest share being in Asia (India and China together account for 37 percent), followed by SSA and Latin America. A slum is defined as a district of a city marked by poverty and inferior living conditions. SSA has the highest share of its urban population living in slum conditions, 72 percent, followed by Asia at 56 percent (UN Population Fund, 2007). In Latin America, roughly half of the urban population is considered to be living in slums. Latin America has the highest level of income inequality in the world and, compared with other developing regions, it has the largest share of the population living in the urban areas, 70 percent.

Poverty in the urban areas of developing countries is growing faster than in rural areas. A recent World Bank and IMF report based on more than 200 surveys in 90 developing countries documented a slower pace of poverty reduction during 1993 to 2000 than in the past. The report showed that the growth in urban poverty was 30 percent higher than rural poverty during that time period. This translated into an additional 50 million poor people in urban areas (those living on less than \$1 a day) in a period of just 7 years (IMF, September 2007). In absolute terms, rural poverty remains higher than urban poverty, but urban poverty is growing at a faster rate.

Urban population growth has two components: natural growth in population and rural migration. Natural growth accounts for about half of the poverty growth and the rate is high because lower income populations tend to have higher fertility rates than the higher income segment of the population. The situation is clearly more precarious in the lower income countries where poverty is deeper. As for the second component of growth in urban poverty, people are looking for what they perceive to be better opportunities in the urban areas, particularly in terms of employment and amenities, while in some cases migrants are fleeing political violence. Therefore, they leave rural areas and head for urban areas. But often, the wages received in these areas are not that high, particularly given the higher cost of living, so their actual incomes and standards of living may not be any higher, and may perhaps be lower, than they were in rural areas.

The urban economy is highly monetized and the costs of food, accommodations, transportation, and other services are much higher in urban than rural areas. The differential in urban-rural cost of living has widened since the adoption of structural adjustment policies in the 1980s (UN Economic and Social Council, September 2007). Prior to the adoption of these policies, the governments of most developing countries were the sole providers of basic consumer services. In addition to cutting budgets, these policies called for the privatization of many functions previously held by the government. Because of inadequate resources, the private sector was not able to enter the market immediately and fill the void in providing services. As a result, the informal

sector grew and because this sector is not subject to any regulation, prices for services grew rapidly. In Africa, where urban poverty is the highest, the informal sector employs about 80 percent of the labor force. The informal sector is economic activity that is neither taxed nor monitored by a government; and is not included in that government's gross national product (GNP) as opposed to a formal economy.

Regionally, SSA countries have the highest rates of urban growth and the highest levels of urban poverty in the world (UN, *The State of the World's Cities Report*, 2006/07). The population living in slums in SSA doubled during 1990 to 2005 when it reached 200 million. This does not mean that the situation is favorable for the urban population in that region who do not live in slums. In the Central African Republic, Chad, and Ethiopia, for example, as many as 90 percent of non-slum urban households lack access to clean water and sanitation, and waste disposal is a huge health issue. For many countries in the region, political violence plus a poor rural economy were responsible for the huge influx of urban migration.

In Asia, the percent of the urban population living in slums ranges from 43 percent in southern Asia to 37 percent in eastern Asia to 24 percent in western Asia. In the lower income countries, such as Cambodia and Nepal, urbanization growth is three times higher than rural growth. According to a World Bank study, rural poverty in Asia is declining significantly while it is increasing in the urban areas (World Bank, April 2007).

In Latin America, where 50 percent of the poor live in cities, the gap between social needs and social resources is growing but inter-regional migration continues to cushion the deepening of poverty. In the Central American countries of Guatemala, El Salvador, Nicaragua, and Honduras, up to 25 percent of the population have migrated north to Mexico, the United States, or Canada for better economic opportunities. In 2004, remittance flows contributed 10 to 18 percent of GDP in these countries. The remittance amount is three to seven times greater than the contribution of tourism, one of the larger sources of foreign exchange earnings for these countries.

High Urban Exposure to Economic Shocks

An important feature affecting developing countries' urban food markets is growing import dependence. In many countries, imported foods, including basic staple foods such as grains and vegetable oils, are an important component of food supplies in urban areas. From 2004-06, in the lower income Latin American and Caribbean countries, the import share of total grain supplies equaled 45 percent, compared with 31 percent for SSA, and 12 percent in lower income Asian countries. At the country level, the situation varies significantly. For example, imports accounted for more than half of grain supplies in 11 SSA countries (Eritrea, Somalia, Angola, Lesotho, Swaziland, Zimbabwe, Cape Verde, Gambia, Liberia, Mauritania, and Senegal) in 2005-06. In 7 countries (Cameroon, the Democratic Republic of Congo, Mozambique, Benin, Côte d'Ivoire, Ghana, and Guinea-Bissau), the import share was in the range of 30 to 50 percent.

In many countries, most of the imported commodities remain in urban areas because weak infrastructure precludes distribution throughout the country,

especially in the rural areas. In addition, urban areas, unlike rural areas, do not rely solely or even significantly on regionally or locally produced foods. A larger component of urban residents' diets is likely to be comprised of imported foods.

High import dependence, especially for lower income countries with limited foreign exchange reserves, means that any increase in import prices or decline in export earnings could force a decline in food imports, causing their food security to deteriorate. There is also the internal market dysfunction that makes urban consumers vulnerable to changes in global economic conditions. During the last two decades, the policies of economic openness adopted by countries, to varying degrees, were implemented in environments where economic signals are not fully transmitted between urban and rural markets. While these weak linkages buffer, to some extent, the rural communities from both urban and global economic downturns, they also limit the benefits of an economic upturn. The rising commodity prices of 2002-08 should have improved production incentives in the agricultural sector, but responses were minimal in most SSA countries. An ERS study of five SSA countries (Ghana, Kenya, Mozambique, Senegal, and Uganda) showed that a variety of factors mitigated a local supply response to the higher prices, including rising costs of imported inputs and transportation and infrastructure constraints (Shapouri, 2008). These higher prices were, however, transmitted to consumers in most cases. In some instances (e.g., Mozambique and Senegal), governments did intervene to counter the higher consumer prices, but in all instances, consumers experienced significant price increases.

During 2002-07, international food prices grew by about 50 percent, but in SSA, the food prices in 21 capital cities grew by an average of 64 percent. In Angola, Ghana, and Kenya, food prices more than doubled. Only a few countries in the region were spared. For comparison, food prices in the United States during this period increased by 10 percent (UN, International Labour Organization, *Statistics*, various issues; USDA, ERS website briefing room Food CPI and Expenditures).

The higher food costs in lower income countries in particular are the result of higher transportation costs, both within the countries and for ocean freight, internal market rigidity, limited competition, and the lack of government oversight and regulations. Since May 2008, global prices for several food items such as corn, a staple food in SSA, declined, but trends in various urban centers in the region varied considerably. The monthly global corn price from May through October 2008 declined by 25 percent, but in Malawi (Blantyre), monthly corn prices nearly doubled. In Zambia (Lusaka), the corn price jumped 75 percent, in Mozambique (Maputo), it increased 48 percent. In Kenya (Nairobi), it rose by 7 percent. In only two countries, Ethiopia (Addis Ababa) and Tanzania (Dar es Salaam), did corn prices decline, however, not at the same rate as international prices, but at 8 and 20 percent (U.S. Agency for International Development Famine Early Warning System (FEWSNET), various issues). In early 2008, riots broke out in several countries including Burkina Faso, Cameroon, Senegal, and Mauritania, protesting the higher food and fuel prices.

Urban Food-Safety Concerns Contribute to Food Insecurity

Another problem facing the urban poor is the unhealthy living conditions that are closely linked to food safety and security. According to the UN, about 1.1 billion people in developing countries have inadequate access to clean water and 2.6 billion people lack basic sanitation. Even in the higher income developing region of Latin America, 32 percent of urban households do not have access to clean drinkable water and 57 percent do not have waste discharge services. The situation is worse in slums, where only one-third have access to sanitary disposal of human waste.

Inadequate access to clean water and basic sanitation, combined with crowded urban conditions, exposes the people in urban slums to a high health risk. Globally, household water use is about 5 percent of total water use, but there is a tremendous inequality in access to clean water among households with different income levels (UN Development Program, 2006). In high-income households in Latin American, Asia, and SSA cities, per capita water use is several hundred liters per day. By contrast, water use in those cities' slums is less than 20 liters per day (the level required to meet basic human needs). An additional issue is the discrepancy in the cost of water, which is due to a lack of adequate infrastructure. The poor pay much more than the rich in the same city. In diverse cities such as Jakarta (Indonesia), Manila (the Philippines), Nairobi (Kenya), Mumbai (India), and Dar es Salaam (Tanzania), people in slums pay 5 to 10 times more for clean water than people in the wealthier parts of the cities.

Inaccessibility to clean water and decent sanitation breeds disease, including foodborne disease. According to the World Health Organization (WHO), more than 30 percent of people in the world suffer from foodborne disease annually, with 1.8 million people dying from diarrhea that is caused by contaminated food and/or water. In most cases, foodborne disease does not lead to death, but it will amplify the impact of poor diet including malabsorption and nutritional losses of food (WHO, September 2003). Children in particular are highly vulnerable to an unhealthy environment. A study of the health of children living in Ahmedabad, the largest city in Gujarat state in India, showed that infant mortality rates in slums were twice the rate of the rural areas, on average. And, slum children have more nutritional deficiencies than average children in the state (USAID, 2002). The same condition was reported for slums in Manila, where infant mortality rates were three times higher in slums than non-slums.

The general level of food safety tends to be lower in developing countries because producers and processors often lack strict controls and certification systems that are commonly implemented in developed countries. Water quality is often poor, contamination with heavy metals from industrial or mining activities is common, and food is more likely to be adulterated with toxic farm chemicals and food additives. Although food-safety data in developing countries are scarce, monthly data on refusals of food shipments by the U.S. Food and Drug Administration showed that 65 percent of food shipments refused between November 2007 and October 2008 were from developing countries.¹ (FDA regulates all food in the United States with the

¹The FDA refusals do not reflect the quantity of food refused since shipments can vary in size. FDA can refuse a shipment if it appears to be adulterated, does not meet U.S. labeling requirements, lacks proper manufacturer registrations, or otherwise does not comply with U.S. regulations. See *U.S. Food and Agricultural Imports: Safeguards and Selected Issues*, by Geoffrey S. Becker, Congressional Research Service, August 14, 2008, and *Food Safety and Imports: An Analysis of FDA Import Refusal Reports*, by Jean C. Buzby, Laurian J. Unnevehr, and Donna Roberts, USDA, Economic Research Service, EIB-39, September 2008.

exception of meat, eggs, and poultry.) To put this statistic in context, developing countries accounted for 36 percent of all foods imported into the United States during that period.

Overall, developing countries' food standards tend to be lower than developed countries', but there is also a cadre of larger, more highly capitalized companies that invest in advanced equipment, modern plant layouts, and management systems, and those companies are able to attain international certifications. These high-standard suppliers often operate alongside smaller suppliers with lower standards and may procure raw materials from local supply chains with weak safety controls. This mingling of products from suppliers with high food-safety standards with products from suppliers with lower standards complicates the detection of fraudulent activities such as mislabeling of product content (UN FAO, October 2008).

Food-safety risks faced by the urban poor in developing countries also arise from poor food handling and sanitation. With urbanization, growth in the sale of street foods has become popular because street food requires limited capital assets to meet growing markets. Small-scale food production in and around urban areas, legal or illegal, is a major source of food, particularly for the poor, but also is a potential source of foodborne illness. Enforcing stringent health regulations on such practices increases the cost of food, thereby imposing additional financial pressure on households that are already allocating a high percentage of their income on food. In addition, street-vended foods make a significant contribution to the urban economy. For example, street foods are estimated to generate annual earnings of \$100 million in Accra, Ghana (Nicolaides, 2008).

The poor nutrition of diets in slums, when combined with the lack of access to clean water and sanitation in a crowded environment, exacerbates the health situation of the poor. If the growing urbanization scenario is added to such conditions, the nutritional well-being of people living in those countries and the health systems of the countries could face serious challenges in the future. In SSA, for example, losses associated with health-related reductions in production equaled about 5 percent of GDP or about \$28 billion in 2003 (UN Development Program, 2006). This exceeded the total aid flow and debt relief to the region.

Conclusions and Policy Options

According to UN estimates, during the first half of the 21st century all population growth will be in urban areas. By 2030, a majority of people in all developing countries will live in urban areas. Poor and food-insecure people will account for a large share of urban growth because of both rural migration and natural growth, since fertility rates are higher among the poor than among higher income populations. These developments will translate to higher poverty and more food insecurity in urban versus rural areas and present a challenge to create employment opportunities for the urban poor. It is estimated that about 60 percent of the urban slum population will be under the age of 18 by 2030 (UN Population Fund, 2007). This realization has not yet translated into policy action in most countries. Poverty is still viewed by many as a rural problem, as both governments and donors continue to allocate resources to rural development in order to reverse the bias of urban policies of the 1970s and 1980s.

Countries are planning and implementing various schemes to slow urbanization growth. The Government of India, for example, under the National Urban Scheme, provides 100 days of employment for rural households on the condition that an adult family member is willing to perform rural unskilled labor. In China, urban migration is controlled by the government, but despite those efforts, the UN projects that China's urban population will approach a 50-percent share by the end of this decade. In SSA, governments have increased investment in rural development with the expectation that this will slow the pace of urban migration, but so far there is no evidence to suggest that this will happen.

The question is: can the experience of the developed countries that adjusted and accommodated high urban growth rates be replicated by developing countries? The answer is not simple because of the differences in public attention and investment. One important factor in developed countries that forced them to address the urban problem was the pressure applied by the wealthy urban population since their lives were affected by the poor living conditions in the slums. However, given the technological advantages available today, the situation has changed. Rich people are now able to purchase services such as pumps for water or portable electricity, thereby protecting themselves from the unhealthy conditions of the urban poor. That schism reduces pressure on developing country governments to invest in urban public services of which the poor are the main beneficiaries.

Growing food-import dependence, in lower income countries in particular, is an urban food-security issue because poor infrastructure precludes imports from being distributed throughout a country. Thus, any increase in import prices or decline in import capacity could lead to a decline in food imports, thereby intensifying food-security vulnerability in urban areas. On the positive side, urbanization expands access to a variety of foods with potential nutritional benefits, albeit at a financial cost because food prices in urban areas are much higher than those in rural areas.

In addition, food safety is a critical concern as consumption becomes more dependent on purchases from markets instead of home cooking. Impacts of unsafe food can have significant health consequences as has become apparent in China during the last few years. The risk is serious, but ensuring food safety will probably be challenging because it requires coordination across the food chain from food production to processing to distribution, and institutional capacity to deal with the situation is limited in most developing countries. However, the health repercussions and economic costs of ignoring the problem can be tremendous in the growing urban environment. Information and education are two critical factors in improving food safety. Improved understanding of food-safety issues by consumers and processors could increase the willingness of consumers to pay more for safe food and be an incentive for producers and processors to produce safer foods.

To improve urban food access, urban gardening is being promoted in some countries. The goal, in addition to increasing food availability, is to enhance urban diets, as well as to generate income for urban households and to improve efficiency of resource use. For fresh produce, in particular, urban production has a comparative advantage in terms of marketing and distance to high concentrations of people. In Cuba, for example, new land is brought

into use by planting vegetables on raised-bed containers in patios, yards, and around houses. Similar steps are being taken in Uruguay and Ecuador. Several Asian countries including Vietnam are also promoting urban gardening. In SSA, urban food production is documented in varying degrees and it is mainly a food-security coping mechanism for those who have access to land. In eastern and southern Africa, in the cities of Kampala (Uganda), Maputo (Mozambique), Harare (Zimbabwe), and Lusaka (Zambia), households traditionally have had access to small plots and are producing staple foods such as corn, peanuts, and cassava for their own consumption.

Urban food production has potential benefits, but also has the risk of contamination during and after production. The risk related to urban food production could be higher than rural production because of limited access to clean water and high population density. But with some quality control, urban agriculture can contribute to a healthier, safer living environment. Urban food production, however, cannot provide enough food for the growing urban population. To improve food security in the urban areas, improvements in infrastructure both in urban and rural areas are critical to allow for efficient flows of food into cities from national and international sources (see box, “China’s Urbanization Changes Diets”). It is important to note that simply increasing food production without effective links to growing urban markets will not enhance food security in urbanizing countries. Improved safety net systems to help cope with production and economic shocks are likely to become more important as urban population rises.

China's Urbanization Changes Diet

China's urbanization is now in full swing. Strict controls on population movement and collective farmland ownership kept most rural people tied to their villages until the 1990s economic boom unleashed the forces of urbanization. Since the 1990s, a dramatic increase in movement of people and agricultural commodities from the countryside to the city and from province to province has played a role in China's economic expansion. Investments in infrastructure—highways, roads, wholesale markets, and agricultural information networks—and complementary growth in mobile phone, information technology, and long distance bus service industries facilitated urbanization and market integration.

China's National Bureau of Statistics reported the urban share of population was 46 percent in 2008, up from about 30 percent in the 1990s. A building boom has pushed the boundaries of cities further into the countryside and many county towns have been transformed into modern satellite cities. Hundreds of industrial parks built on village land have brought factory jobs and urban lifestyles to the countryside.

Eating habits in Chinese cities have evolved with the rise of supermarkets, workplace cafeterias, and restaurant chains that are displacing traditional open-air markets and home cooking. Urban diets have diversified from the traditional staples of rice, noodles, steamed bread, cabbage, and pork to include vegetables, fruits, meats, fish, and poultry (fresh and processed)—from all over China. Government programs subsidized milk sales in school cafeterias, contributing to a sharp increase in milk consumption. Obesity has emerged as a problem among city children indulged with trips to fast-food restaurants and after-school treats and adult officials engaged in business banquets night after night.

A distinctive feature of China's urbanization is its 100 to 200 million rural migrants who move back and forth between villages and cities. These elusive migrants are difficult to count since they work and live temporarily in factory dormitories, construction sites, or rented rooms. Most have parents, spouses, or children in their villages, and many return there after saving enough money to marry or start a business. As economic growth accelerated in recent years, many villages were emptied of their peak working-age population.

The diets and lifestyles of rural people also began to change as a result of the burgeoning growth in recent years as cities and industrial parks spilled into the countryside. Eating habits and lifestyles change markedly when migrants work in cities. Migrants often subsist on basic meals supplied by their employers, but they are exposed to snacks and other foods unavailable in their villages. The remittances they send home to their families provide cash that monetizes

village economies and loosens their reliance on subsistence farming. In the early 1990s, official survey statistics showed that cash purchases only accounted for 45 percent of rural household food expenditures—most “expenditures” were the imputed value of self-produced foods—but the cash share had jumped to 70 percent of rural food expenditures by 2007.

China's officials are concerned about the impact of urbanization on food security. Since 2004, the Government has rolled out a series of farm subsidies, tightened controls on farmland conversion, and devised wide-ranging schemes to raise farm productivity and improve marketing efficiency. A 2008-2020 food-security plan decreed a minimum cultivated land area of 120 million hectares, set targets for increased grain yields, and aimed for maintaining self-sufficiency in rice and wheat and “basic self sufficiency” in corn and livestock products. China has long held large government reserves of wheat, rice, and corn. In 2008, when world grain prices were soaring, China held grain reserves that were more than double the 17-18 percent of annual consumption recommended by the United Nations' Food and Agriculture Organization (the actual quantity is kept secret). In recent years, Chinese officials decided to build up reserves of other foods, including pork, vegetable oil, rapeseed, soybeans, and sugar.

Food is plentiful and inexpensive—the share of urban household expenditures devoted to food fell from over half in the early 1990s to 35 percent in 2007. While China now accounts for about half of the world's soybean imports, it remains a net exporter of cereal grains, aquaculture, and horticultural products. Agricultural output grew roughly 4-5 percent annually during the most recent decade despite declining farm labor and land input. China had five consecutive increases in grain production from 2004 to 2008, with a record output recorded in 2008. Grain reserves swelled as the Government aggressively purchased grain to support prices after the record 2008 harvest.

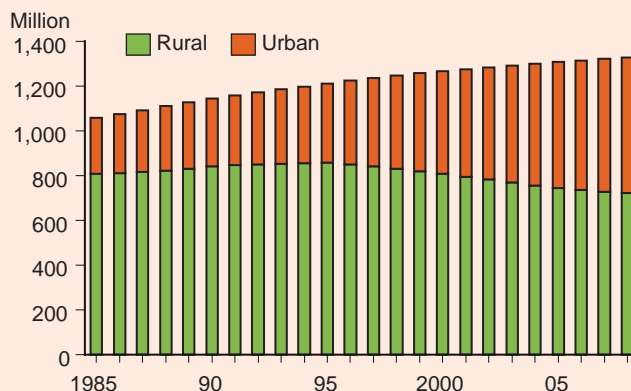
The agricultural sector has become more efficient. The withdrawal of farm laborers facilitated a transition to a more commercialized and productive mode of agriculture. Pork production has shifted from “backyard” modes in which farmers fed pigs scraps and crop stalks for a whole year to specialized farms that raise pigs to market weight in 4-6 months using commercial feeds. Due in part to these efficiencies, China has managed to expand meat production fourfold since the 1980s while remaining an exporter of corn. With the improvement of marketing channels, production of commodities is concentrating in the regions where they can be grown more efficiently. Improved infrastructure and food handling have reduced waste.

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As urbanization proceeds, officials are exploring new ways to commercialize the country's small-scale farm structure and squeeze more production out of the farm sector. They are experimenting with a campaign for "modern agriculture" that includes wide-ranging programs such as agricultural mechanization, soil conservation, improving seeds and animal breeds, and building networks of breeding farms, greenhouses, fish ponds, and feedlots. Officials are exploring options for improving rural credit availability and allowing farmers to consolidate farmland into larger scale operations while preserving the collective land ownership system. Moreover, attractive profits from supplying the growing domestic market will give Chinese farmers incentives to keep production growing fast enough to feed China's urbanizing population.

China's urban population has grown steadily since 1985



Source: ERS analysis of data from China National Bureau of Statistics.

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Appendix—Food Security Model: Definition and Methodology

Shahla Shapouri

The Food Security Assessment model used in this report was developed by USDA's Economic Research Service for use in projecting food consumption and access and food gaps (previously called food needs) in lower income countries through 2018. The reference to food is divided into three groups: grains, root crops, and a category called "other," which includes all other commodities consumed, thus covering 100 percent of food consumption. All of these commodities are expressed in grain equivalent.

Food security of a country is evaluated based on the gap between projected domestic food consumption (produced domestically plus imported minus nonfood use) and a consumption requirement. Like last year, we use total food aid data (cereal and noncereal food commodities) provided by the United Nations' World Food Programme (WFP). All food aid commodities were converted into grain equivalent based on calorie content to allow aggregation. For example: grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers, is therefore equivalent to 0.29 ton of grain (1 divided by 3.5), one ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

It should be noted that while projection results will provide a baseline for the food security of the countries, results depend on assumptions and specifications of the model. Since the model is based on historical data, it implicitly assumes that the historical trend in key variables will continue in the future.

Two kinds of food gaps are estimated and projected:

1. The national average nutrition gap, where the objective is to maintain the daily caloric intake standards of 2,100 calories per capita per day. The caloric requirements (based on total share of grains, root crops, and "other") used in this assessment are those necessary to sustain life with minimum food-gathering activities.
2. The distribution gap, where the objective is to let each income group reach the caloric standard. Based on a methodology explained below, food availability by income group is calculated. If food availability in a given income group is lower than the caloric requirements, that difference is part of the distribution gap for this country.

This nutrition-based target assists in comparisons of relative well-being. Large nutrition-based needs mean additional food must be provided if improved nutrition levels are the main objective. The national average nutritional gap approach, however, fails to address inequalities of food distribution within a country. Those are addressed by the distribution gap.

Structural framework for estimating and projecting food consumption in the aggregate and by income group

Projection of food availability—The simulation framework used for projecting aggregate food availability is based on partial equilibrium recursive models of 70 lower income countries. The country models are synthetic, meaning that the parameters that are used are either cross-country estimates or are estimated by other studies. Each country model includes three commodity groups: grains, root crops and “other.” The production side of the grain and root crops are divided into yield and area response. Crop area is a function of 1-year lag return (real price times yield), while yield responds to input use. Commercial imports are assumed to be a function of domestic price, world commodity price, and foreign exchange availability. Food aid received by countries is assumed constant at the base level during the projection period. Foreign exchange availability is a key determinant of commercial food imports and is the sum of the value of export earnings and net flow of credit. Foreign exchange availability is assumed to be equal to foreign exchange use, meaning that foreign exchange reserve is assumed constant during the projection period. Countries are assumed to be price takers in the international market, meaning that world prices are exogenous in the model. However, producer prices are linked to the international market. The projection of consumption for the “other” commodities is simply based on a trend that follows the projected growth in supply of the food crops (grains plus root crops). Although this is a very simplistic approach, it represents an improvement from the previous assessments where the contribution by commodities to the diet, such as meat and dairy products, was overlooked. The plan is to enhance this aspect of the model in the future.

For the commodity group grains and root crops (c), food consumption (FC) is defined as domestic supply (DS) minus nonfood use (NF). n is country index and t is time index.

$$FC_{cnt} = DS_{cnt} - NF_{cnt} \quad (1)$$

Nonfood use is the sum of seed use (SD), feed use (FD), exports (EX), and other uses (OU).

$$NF_{cnt} = SD_{cnt} + FD_{cnt} + EX_{cnt} + OU_{cnt} \quad (2)$$

Domestic supply of a commodity group is the sum of domestic production (PR) plus commercial imports (CI), changes in stocks ($CSTK$), and food aid (FA).

$$DS_{cnt} = PR_{cnt} + CI_{cnt} + CSTK_{cnt} + FA_{cnt} \quad (3)$$

Production is generally determined by the area and yield response functions:

$$PR_{cnt} = AR_{cnt} * YL_{cnt} \quad (4)$$

$$YL_{cnt} = f(LB_{cnt}, FR_{cnt}, K_{cnt}, T_{cnt}) \quad (5)$$

$$RPY_{cnt} = YL_{cnt} * DP_{cnt} \quad (6)$$

$$RNPY_{cnt} = NYL_{cnt} * NDP_{cnt} \quad (7)$$

$$AR_{cnt} = f(AR_{cnt-1}, RPY_{cnt-1}, RNPY_{cnt-1}, Z_{cnt}) \quad (8)$$

where AR is area, YL is yield, LB is rural labor, FR is fertilizer use, K is an indicator of capital use, T is the indicator of technology change, DP is real domestic price, RPY is yield times real price, NDP is real domestic substitute price, NYL is yield of substitute commodity, $RNPY$ is yield of substitute commodity times substitute price, and Z is exogenous policies.

The commercial import demand function is defined as:

$$CI_{cnt} = f(WPR_{ct}, NWPR_{ct}, FEX_{nt}, PR_{cnt}, M_{nt}) \quad (9)$$

where WPR is real world food price, $NWPR$ is real world substitute price, FEX is real foreign exchange availability, and M is import restriction policies.

The real domestic price is defined as:

$$DP_{cnt} = f(DP_{cnt-1}, DS_{cnt}, NDS_{cnt}, GD_{nt}, EXR_{nt}) \quad (10)$$

where NDS is supply of substitute commodity, GD is real income, and EXR is real exchange rate.

Estimations/projections of food consumption by income group—Inadequate access to food is the most important cause of chronic food insecurity among developing countries and is related to income level. Estimates of food gaps at the aggregate or national level fail to take into account the distribution of food consumption among different income groups. Lack of consumption distribution data for the study countries is the key factor preventing estimation of food consumption by income group. An attempt was made to fill this information gap by using an indirect method of projecting calorie consumption by different income groups based on income distribution data.¹ It should be noted that this approach ignores the consumption substitution of different food groups by income class. The procedure uses the concept of the income/consumption relationship and allocates the total projected amount of available food among different income groups in each country (income distributions are assumed constant during the projection period).

Assuming a declining consumption and income relationship (semi log functional form):

$$C = a + b \ln Y \quad (11)$$

$$C = C_o/P \quad (12)$$

$$P = P_1 + \dots + P_i \quad (13)$$

$$Y = Y_o/P \quad (14)$$

$$i = 1 \text{ to } 5$$

where C and Y are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all quintiles), C_o is total food consumption, P is the total population, i is income quintile, a is the intercept, b is the consumption income propensity, and b/C is consumption income elasticity (point estimate elasticity is calculated for individual countries). To estimate per capita consumption by income group, the parameter b was estimated based on cross-country (70 lower income countries) data for per capita calorie consumption and income. The parameter a is estimated for each

¹The method is similar to that used by Shlomo Reutlinger and Marcelo Selowsky in *Malnutrition and Poverty*, World Bank, 1978.

country based on the known data for average per capita calorie consumption and per capita income.

Data

Historical supply and use data for 1990-2007 are from United Nations' Food and Agriculture Organization's FAOSTAT as of March 2009. Food aid data are from the United Nations' World Food Programme (WFP) for 1988-2007, and financial data are from the International Monetary Fund and World Bank. The base year data used for projections are the average for 2005-07, except export earnings, which are 2004-06.

Endogenous projection variables:

Production, area, yield, commercial imports, domestic producer prices, and food consumption.

Exogenous projection variables:

Population—data are medium United Nations population projections as of 2005.

World price—data are USDA/baseline projections.

Stocks—FAOSTAT data; assumed constant during the projection period.

Seed use—USDA data; projections are based on area projections using constant base seed/area ratio.

Food exports—FAOSTAT data, projections are either based on the population growth rate or extrapolation of historical trends.

Inputs—fertilizer and capital projections are, in general, an extrapolation of historical growth data from FAO.

Agricultural labor—projections are based on United Nations population projections, accounting for urbanization growth.

Net foreign credit—is assumed constant during the projection period.

Value of exports—projections are based on World Bank (*Global Economic Prospects and the Developing Countries*, various issues), International Monetary Fund (*World Economic Outlook*, various issues), or an extrapolation of historical growth.

Export deflator or terms of trade—World Bank (*Commodity Markets—Projection of Inflation Indices for Developed Countries*).

Income—projected based on World Bank report (*Global Economic Prospects and the Developing Countries*, various issues); or extrapolation of historical growth.

Income distribution—World Bank data; Income distributions are assumed constant during the projection period.

List of countries and their food gaps in 2008

	2008 food gaps			2008 food gaps	
	Nutrition ¹	Distribution ²		Nutrition ¹	Distribution ²
1,000 tons					
Angola	0	84	Algeria	0	0
Benin	0	87	Egypt	0	0
Burkina Faso	0	54	Morocco	0	0
Burundi	323	433	Tunisia	0	0
Cameroon	107	507	North Africa	0	0
Cape Verde	22	28			
Central African Republic	162	289	Afghanistan	1,999	2,317
Chad	0	193	Bangladesh	0	344
Congo, Dem. Rep.	1,718	2,430	India	0	1,751
Côte d'Ivoire	0	379	Indonesia	0	0
Eritrea	248	291	Korea, Dem. Rep.	2,718	2,868
Ethiopia	0	976	Nepal	0	195
Gambia	60	88	Pakistan	0	482
Ghana	0	229	Philippines	0	91
Guinea	0	0	Sri Lanka	0	0
Guinea-Bissau	69	95	Vietnam	0	0
Kenya	826	1,350	Asia	4,716	8,048
Lesotho	45	107			
Liberia	91	171	Bolivia	0	216
Madagascar	0	98	Colombia	0	298
Malawi	0	24	Dominican Republic	0	75
Mali	0	21	Ecuador	0	58
Mauritania	0	51	El Salvador	0	44
Mozambique	0	322	Guatemala	0	189
Niger	0	522	Haiti	323	526
Nigeria	0	668	Honduras	0	153
Rwanda	196	255	Jamaica	0	5
Senegal	0	16	Nicaragua	0	88
Sierra Leone	0	236	Peru	0	217
Somalia	882	917	Latin America and the Caribbean	323	1,868
Sudan	0	313			
Swaziland	4	37			
Tanzania	0	569	Armenia	0	0
Togo	0	118	Azerbaijan	0	0
Uganda	0	471	Georgia	0	15
Zambia	136	366	Kazakhstan	0	0
Zimbabwe	1,419	1,576	Kyrgyzstan	0	0
Sub-Saharan Africa	6,307	14,368	Tajikistan	53	107
			Turkmenistan	0	0
			Uzbekistan	0	0
			Commonwealth of Independent States	53	123
			Total	11,399	24,407

¹Nutrition gap: gap between available food and food needed to support a per capita standard.

²Distribution gap: amount of food needed to raise consumption in each income quintile to the nutritional requirement.

Source: Economic Research Service.

List of countries and their food gaps in 2018

	2018 food gaps			2018 food gaps	
	Nutrition ¹	Distribution ²		Nutrition ¹	Distribution ²
1,000 tons					
Angola	0	73	Algeria	0	0
Benin	24	223	Egypt	0	0
Burkina Faso	0	337	Morocco	0	0
Burundi	423	569	Tunisia	0	0
Cameroon	0	350	North Africa	0	0
Cape Verde	27	34			
Central African Republic	234	379	Afghanistan	1,639	2,150
Chad	61	435	Bangladesh	0	317
Congo, Dem. Rep.	2,368	3,328	India	0	656
Côte d'Ivoire	0	161	Indonesia	0	0
Eritrea	796	831	Korea, Dem. Rep.	1,108	1,328
Ethiopia	0	670	Nepal	0	239
Gambia	0	47	Pakistan	0	550
Ghana	0	123	Philippines	0	0
Guinea	0	19	Sri Lanka	0	0
Guinea-Bissau	51	98	Vietnam	0	0
Kenya	0	661	Asia	2,746	5,239
Lesotho	0	30			
Liberia	404	477	Bolivia	0	185
Madagascar	0	680	Colombia	0	269
Malawi	0	190	Dominican Rep.	0	26
Mali	0	278	Ecuador	0	14
Mauritania	130	169	El Salvador	0	30
Mozambique	0	262	Guatemala	0	289
Niger	1,143	1,619	Haiti	0	258
Nigeria	0	816	Honduras	0	141
Rwanda	403	467	Jamaica	0	0
Senegal	0	264	Nicaragua	0	51
Sierra Leone	0	430	Peru	0	165
Somalia	1,055	1,103	Latin America and the Caribbean	0	1,429
Sudan	0	155			
Swaziland	0	12			
Tanzania	0	648	Armenia	0	0
Togo	85	208	Azerbaijan	0	0
Uganda	85	902	Georgia	0	0
Zambia	0	172	Kazakhstan	0	0
Zimbabwe	138	519	Kyrgyzstan	0	0
Sub-Saharan Africa	7,428	17,738	Tajikistan	0	53
			Turkmenistan	0	0
			Uzbekistan	0	0
			Commonwealth of Independent States	0	53
			Total	10,174	24,459

¹Nutrition gap: gap between available food and food needed to support a per capita nutritional standard.

²Distribution gap: amount of food needed to raise consumption in each income quintile to the nutritional requirement.

Source: USDA, Economic Research Service.

Appendix table 2

Number of food-insecure people, 2008 and 2018

	2008	2018		2008	2018
<i>Millions of people</i>					
Asia	379	296	SSA	385	483
Afghanistan	28	39	Cameroon	15	14
Bangladesh	32	38	CAR	4	5
India	237	135	Zaire	52	70
Indonesia	0	0	Burundi	9	11
Korea	28	31	Eritrea	5	7
Nepal	11	14	Ethiopia	51	43
Pakistan	33	40	Kenya	31	30
Philippines	9	0	Rwanda	8	13
Sri Lanka	0	0	Somalia	9	12
Viet Nam	0	0	Sudan	16	10
			Tanzania	25	31
LAC	48	52	Uganda	19	35
Bolivia	4	5	Angola	3	5
Colombia	9	10	Lesotho	2	1
Dominican R.	4	2	Madagascar	4	15
El Salvador	1	2	Malawi	3	7
Guatemala	5	10	Mozambique	13	10
Haiti	8	7	Swaziland	1	0
Honduras	4	5	Zambia	10	3
Jamaica	1	0	Zimbabwe	14	12
Nicaragua	3	3	Benin*	4	7
Ecuador	3	2	Burkina Faso	3	12
Peru	6	6	Cape Verde	1	1
			Chad	7	12
North Africa	0	0	Côte d'Ivoire	12	9
Algeria	0	0	Gambia	2	1
Egypt	0	0	Ghana	10	6
Morocco	0	0	Guinea	0	2
Tunisia	0	0	Guinea-Bissau	2	2
			Liberia	3	6
CIS	6	3	Mali	1	7
Armenia	0	0	Mauritania	2	4
Azerbaijan	0	0	Niger	9	21
Georgia	1	0	Nigeria	30	37
Kazakhstan	0	0	Senegal	3	9
Kyrgyzstan	0	0	Sierra Leone	2	4
Tajikistan	5	3	Togo	4	7
Turkmenistan	0	0			
Uzbekistan	0	0			
			Grand total	819	834

Source: USDA, Economic Research Service.

Appendix table 3

Country indicators

Region and country	Population, 2008	Population annual growth rate	Grain production		Root production annual growth rate, 1990-2007	Projected annual growth in supply, 2008-18
			Annual growth rate, 1990-2007	Coefficient of variation, 1990-2007		
	1,000		Percent			
North Africa:						
Algeria	34,372	1.5	4.0	47.1	5.2	0.7
Egypt	76,792	1.8	3.3	3.3	2.7	1.2
Morocco	31,613	1.2	0.2	49.3	3.2	1.9
Tunisia	10,437	1.1	0.4	42.3	3.6	1.4
Central Africa:						
Cameroon	18,893	2.0	3.7	8.6	3.4	2.1
Central African Rep.	4,427	1.8	6.0	10.3	1.1	1.3
Congo, Dem. Rep.	64,703	3.3	2.3	9.5	-1.1	3.0
West Africa:						
Benin	9,294	3.1	4.5	8.5	6.3	2.4
Burkina Faso	15,194	2.9	3.8	12.7	2.6	1.8
Cape Verde	542	2.3	0.1	71.5	0.2	2.4
Chad	11,060	2.9	5.8	18.2	1.3	2.1
Côte d'Ivoire	19,639	1.9	0.6	3.7	3.0	2.8
Gambia	1,750	2.7	6.7	16.7	1.9	3.6
Ghana	23,920	2.0	2.9	11.7	5.1	2.3
Guinea	9,605	2.2	5.3	4.9	3.1	1.3
Guinea-Bissau	1,746	3.0	0.5	14.9	3.5	3.7
Liberia	3,940	4.6	2.3	39.9	5.1	1.8
Mali	12,713	2.8	3.8	12.0	13.0	1.3
Mauritania	3,197	2.6	0.5	28.5	1.7	1.0
Niger	14,727	3.5	3.8	15.9	1.0	1.7
Nigeria	151,299	2.3	2.3	7.2	4.7	2.0
Senegal	12,672	2.5	0.9	18.5	11.7	1.1
Sierra Leone	5,938	2.1	2.6	39.3	6.0	1.0
Togo	6,755	2.7	3.5	6.6	2.7	2.2
East Africa:						
Burundi	8,643	3.2	-0.2	7.8	2.1	2.9
Eritrea ¹	4,989	3.3	4.6	72.8	-1.6	0.5
Ethiopia ¹	85,174	2.5	6.3	13.5	3.9	3.1
Kenya	38,546	2.7	1.3	10.4	2.5	3.4
Rwanda	10,031	2.8	3.2	27.1	6.2	2.6
Somalia	8,947	3.0	0.4	32.5	5.3	2.7
Sudan	39,440	2.2	3.3	28.5	5.4	2.4
Tanzania	41,441	2.5	2.4	12.2	0.1	2.4
Uganda	31,903	3.3	3.0	7.8	4.2	2.6

See footnotes at end of table.

Continued—

Country indicators—Continued

	Macroeconomic indicators					
Region and country	Per capita GNI, 2007	Per capita GDP annual growth, 2007	GDP annual growth, 2007	Export earnings annual growth, 2007	Official development assistance as a share of GNI, 2007	External debt Present value as a share of GNI, 2007
	<i>U.S. dollars</i>	<i>Percent</i>				
North Africa:						
Algeria	3,620	1.6	3.1	-0.6	0.3	4.1
Egypt	1,580	5.2	7.1	23.3	0.8	23.2
Morocco	2,290	1.5	2.7	5.2	1.5	27.4
Tunisia	3,210	5.3	6.3	8.5	0.9	60.8
Central Africa:						
Cameroon	1,050	1.5	3.5	-12.1	9.4	15.0
Central African Rep.	370	2.3	4.2	12.7	10.4	57.1
Congo, Dem. Rep.	140	3.5	6.5	9.9	14.2	142.9
West Africa:						
Benin	570	1.5	4.6	--	8.7	15.8
Burkina Faso	430	1.0	4.0	--	13.8	21.9
Cape Verde	2,430	4.6	6.9	13.8	11.8	43.2
Chad	540	-2.1	0.6	-19.2	5.7	29.1
Côte d'Ivoire	920	-0.2	1.7	-9.9	0.9	73.6
Gambia	320	3.6	6.3	6.7	12.1	122.7
Ghana	590	4.2	6.3	2.6	7.7	29.9
Guinea	400	-0.6	1.5	5.9	5.0	72.5
Guinea-Bissau	200	-0.3	2.7	5.1	35.4	213.6
Liberia	140	5.4	9.4	--	124.3	442.1
Mali	500	-0.2	2.8	3.4	15.4	30.6
Mauritania	840	-0.6	1.9	4.9	13.2	62.0
Niger	280	-0.1	3.2	--	12.8	23.0
Nigeria	920	3.6	5.9	--	1.4	6.1
Senegal	830	1.9	4.8	-1.8	7.6	23.3
Sierra Leone	260	4.9	6.8	--	32.9	21.4
Togo	360	-0.7	1.9	--	4.9	80.1
East Africa:						
Burundi	110	-0.3	3.6	--	49.5	154.6
Eritrea ¹	270	-1.8	1.3	-2.3	11.3	64.1
Ethiopia ¹	220	8.4	11.1	10.2	12.5	13.6
Kenya	640	4.2	7.0	6.0	5.3	30.2
Rwanda	320	3.0	6.0	--	21.5	14.9
Somalia	--	--	--	--	--	--
Sudan	950	7.7	10.2	33.6	5.0	46.1
Tanzania	410	4.5	7.1	--	17.4	31.1
Uganda	370	4.3	7.9	12.2	15.0	14.0

See footnotes at end of table.

Continued—

Country indicators—Continued

Region and country	Population, 2008	Population annual growth rate	Grain production		Root production annual growth rate, 1990-2007	Projected annual growth in supply, 2008-18
			Annual growth rate, 1990-2007	Coefficient of variation, 1990-2007		
	1,000		Percent			
Southern Africa:						
Angola	17,494	2.8	6.6	14.7	12.4	2.7
Lesotho	2,019	0.6	-1.9	40.0	4.0	3.9
Madagascar	20,194	2.7	2.6	9.4	0.8	1.5
Malawi	14,285	2.6	3.9	28.4	16.7	1.3
Mozambique	21,770	2.0	9.4	17.0	4.5	2.1
Swaziland	1,146	0.6	-1.4	27.0	1.4	1.8
Zambia	12,153	1.9	1.1	27.9	2.6	3.2
Zimbabwe ³	13,500	1.0	-1.7	40.0	3.7	3.8
Asia:						
Afghanistan	28,137	3.9	3.0	21.6	1.8	3.8
Bangladesh	161,161	1.7	3.3	6.8	7.6	1.7
India	1,185,118	1.5	1.3	4.2	2.7	1.7
Indonesia	234,091	1.2	1.6	2.6	1.2	1.2
Korea, Dem. Rep.	27,972	1.0	-3.3	35.0	8.5	0.0
Nepal	28,743	2.0	2.4	4.6	6.1	2.0
Pakistan	167,074	1.9	2.9	4.9	5.7	1.9
Philippines	89,530	1.9	2.7	7.9	-0.7	2.7
Sri Lanka	19,393	0.5	1.7	9.2	-2.5	0.5
Vietnam	88,472	1.3	4.5	2.6	4.6	2.1
Latin America and the Caribbean:						
Bolivia	9,682	1.8	3.7	11.3	1.4	2.2
Colombia	46,690	1.3	1.0	14.7	-0.3	1.7
Dominican Republic	9,896	1.5	2.4	11.9	0.6	2.9
Ecuador	13,485	1.1	2.6	13.0	-0.5	2.1
El Salvador	6,948	1.4	0.5	9.3	-0.3	2.5
Guatemala	13,685	2.5	-1.1	9.9	6.1	1.5
Haiti	9,747	1.6	-0.4	8.8	-0.1	0.9
Honduras	7,245	2.0	-1.8	9.1	2.9	2.0
Jamaica	2,726	0.5	-4.9	24.1	-2.8	0.9
Nicaragua	5,681	1.3	4.8	11.7	4.9	1.9
Peru	28,235	1.2	6.3	8.9	5.7	2.0
Commonwealth of Independent States ²						
Armenia	2,999	-0.2	1.2	21.5	2.6	2.3
Azerbaijan	8,542	0.8	4.4	22.0	17.8	1.0
Georgia	4,369	-0.8	-0.8	23.0	0.6	2.9
Kazakhstan	15,537	0.7	-1.1	37.3	1.5	0.1
Kyrgyzstan	5,378	1.1	1.2	13.8	11.4	1.1
Tajikistan	6,853	1.5	9.0	18.5	13.4	1.6
Turkmenistan	5,028	1.3	12.5	21.7	17.9	3.3
Uzbekistan	27,768	1.5	8.6	9.3	6.0	1.7

See footnotes at end of table.

Continued—

Country indicators—Continued

Region and country	Macroeconomic indicators					
	Per capita GNI, 2005	Per capita GDP annual growth, 2005	GDP annual growth, 2005	Export earnings annual growth, 2005	Official development assistance as a share of GNI, 2005	External debt Present value as a share of GNI, 2005
	<i>U.S. dollars</i>	<i>Percent</i>				
Southern Africa:						
Angola	1,410	17.2	20.6	--	1.5	40.9
Angola	2,540	18.3	21.1	--	0.5	26.2
Lesotho	1,030	4.3	4.9	14.6	6.4	33.7
Madagascar	320	3.4	6.2	25.0	12.2	22.7
Malawi	250	5.2	7.9	-1.1	20.8	24.6
Mozambique	330	5.3	7.3	-8.2	25.2	44.3
Swaziland	2,560	2.8	3.5	-1.9	2.1	13.3
Zambia	770	4.0	6.0	21.2	10.5	27.9
Zimbabwe ³	340	-6.0	-5.3	-3.4	11.7	133.4
Asia:						
Afghanistan	--	--	5.3	--	35.7	21.1
Bangladesh	470	4.7	6.4	13.0	2.0	29.9
India	950	7.6	9.1	7.5	0.1	18.9
Indonesia	1,650	5.1	6.3	8.0	0.2	33.9
Korea, Dem. Rep.	--	--	--	--	--	--
Nepal	350	1.5	3.2	--	5.7	35.0
Pakistan	860	3.7	6.0	2.3	1.5	28.0
Philippines	1,620	5.2	7.2	5.6	0.4	41.9
Sri Lanka	1,540	6.1	6.8	--	1.8	43.9
Vietnam	770	7.2	8.5	21.0	3.7	36.3
Latin America and the Caribbean:						
Bolivia	1,260	2.8	4.6	3.3	3.7	38.2
Colombia	4,100	6.2	7.5	11.4	0.4	22.5
Dominican Republic	3,560	7.3	8.5	7.6	0.4	29.7
Ecuador	3,110	1.6	2.6	-1.7	0.5	41.3
El Salvador	2,850	3.3	4.7	3.9	0.4	44.4
Guatemala	2,450	3.2	5.7	10.8	1.3	18.7
Haiti	520	1.4	3.2	--	11.4	26.1
Honduras	1,590	4.3	6.3	3.6	4.0	27.8
Jamaica	3,330	-7.7	-7.3	--	0.3	101.0
Nicaragua	990	2.6	3.9	9.7	14.9	60.7
Peru	3,410	7.6	8.9	6.2	0.3	32.6
Commonwealth of Independent States²						
Armenia	2,630	13.8	13.8	-3.5	3.7	30.5
Azerbaijan	2,640	23.9	25.0	43.3	0.9	11.7
Georgia	2,120	13.3	12.4	9.8	3.7	21.7
Kazakhstan	5,020	7.7	8.9	9.0	0.2	103.7
Kyrgyzstan	610	7.3	8.2	25.3	7.4	65.0
Tajikistan	460	6.2	7.8	-1.3	6.1	34.0
Turkmenistan	--	--	--	--	0.2	5.9
Uzbekistan	730	7.9	9.5	32.4	0.7	17.3

Note: GDP = Gross Domestic Product; GNI = Gross National Income.

¹ Data start in 1993.² Data start in 1992.³ Data is from 2005.

-- = data unavailable or not applicable due to inconsistent data set.

Source: Population = FAOSTAT, Macroeconomic indicators = World Development Indicators, 2009, World Development Report 2008, World Bank.